VOLUME 1, NUMBER 3 MARCH 1952

Battelle Technical Review

BATTELLE MEMORIAL INSTITUTE

Volume 1, Number 3
March 1952

BATTELLE TECHNICAL REVIEW

Dedicated to the dissemination of knowledge. Published monthly by Battelle Memorial Institute, an endowed foundation serving mankind through science and technology

contents

Research Planning 23

Air-Pollution Abatement in Industrial Communities, *H. P. Munger & R. B. Engdahl* 24

Printing on the March . . *J. Homer Winkler* 30

Battelle Technical Review—Abstracts 131a

Notes from Battelle 32

Published monthly by Battelle Memorial Institute. Please address all correspondence about articles, abstracts, subscriptions and exchanges to: The Editor, Battelle Technical Review, Battelle Memorial Institute, 505 King Avenue, Columbus 1, Ohio. Application is pending for acceptance under Section 34.64 P. L. and R. Printed in the U. S. A.

Research Planning

In a small company, the owner or manager is an expert in the management of the business. He knows how each department is run, understands the production processes, and is acquainted with sales and distribution problems. When a change in operating methods or products is needed, he is in a position to recognize the need and to do something about it. If the change involves technical research, he can outline a research program.

In a large company, however, management is not so simple a job. The president, or other chief executive, cannot possibly know every phase of the company's operations. He must rely upon department heads for information needed to establish broad management policy. He may know only in a general way the problems of production and distribution, but neither he nor any other one member of the firm knows intimately all the factors relating to the success of the business. It is sometimes difficult for him to determine what changes would be most effective or are most needed. He would have little time for other things if he personally kept in touch with every operation, and probably no time to prepare for the betterment of his company. As a good executive he recognizes his limitations and calls upon specialists for help.

Planning a technical research program is one of the most difficult of all management responsibilities. Here there is need for intimate understanding, not only of the company's products and processes, but also of all technologies that might affect them. In addition, cognizance must be taken of the technological and economic changes affecting both the raw materials and the finished products, and of the technical developments influencing competition.

Operations research is of great value in helping management appraise company operations and plan technical research. In effect, the operations research group is made up of experts in economics, engineering, and science, who are skilled in the collection and analysis of large masses of information and the development of basic conclusions relating to the problem at hand.

Operations are analyzed objectively and in relation to the sum total of industrial knowledge, as well as the company's more circumscribed experience. Statistical techniques, probability theory, and other tools are used to analyze complex and frequently interrelated sequences of activities. An operations research study may establish the soundness of the company's present procedures, or it may show the desirability of change. If a change is indicated, the study points out methods for achieving it, whether they involve technology or other matters.

Frequently, an operations research study will confirm that the company's technical research and development is on the right track and suggestions will be made on how to realize the most from it. At other times, dead-end roads will be uncovered and a re-orientation of efforts will be recommended. Often, a fresh, objective viewpoint will show opportunities that are being missed simply because all the business, technologic, and economic aspects of the problem have not heretofore been considered.

By scientific analysis of the factors involved in production and distribution, it is possible for the management to see clear-cut roads to company betterment, expansion, and prosperity.

Clyde Williams

Director, Battelle Memorial Institute

Air-Pollution Abatement in Industrial Communities

by H. P. MUNGER AND R. B. ENGDAHL

Although their professional training and experience differ widely, the authors have a problem of mutual interest in air pollution. Mr. Engdahl, a graduate of Bucknell and of the University of Illinois, has, since 1941, been engaged in fuels and combustion research. Dr. Munger, who holds degrees from Georgia Institute of Technology, Columbia, and the University of Pittsburgh, has had more than twenty years of varied professional and industrial experience in chemistry and chemical engineering. As a team, these Battelle technologists have made valuable contributions to the knowledge of air purification.

ALTHOUGH the air-pollution problem was first made a matter of public record in specific instances hundreds of years ago, concerted public attention on area air pollution is comparatively recent. Air pollution has usually been an accepted part of the industrial revolution. Where it could not be accepted, the automobile has permitted many to move away from the problem. However, the continued growth of industrial centers and the concentration of population have intensified pollution, while rising standards of living have made it less acceptable.

Air pollution is defined in the *Manual of Standards and Recommended Practices* of the Manufacturing Chemists' Association as "the presence in the air of substances put there by the acts of man, in concentrations sufficient to interfere with the comfort, safety or health of man, or with the full use and enjoyment of his property". This is a common-sense definition. It does not specify definite limits for the contaminant concentration of effluent gases, regardless of topography, meteorology, and other factors. It takes into consideration the ability of the atmosphere to disperse contaminants and man's use of tall stacks and other devices for minimizing the nuisance of industrial contaminants. It recognizes that there will be a difference between the air in a residential area and an industrial area, so long as it does not interfere with "comfort . . . health . . . and the enjoyment of property".

Nature of the Air-Pollution Problem

All of our communities have many potential sources of air pollution other than industrial plants. Among these are the railroads, public buildings, schools, residences, incinerators, small commercial boiler plants, and other locations where combustion or dusty processes are carried on.

When only one plant is located in a community, it is usually not difficult to locate the source of the contaminants. The nature of the pollution and simple observation should be sufficient. In a large industrial area, the problem becomes more complex and other means must be employed in air-pollution studies.

Topography may become an important factor. This was evident at Trail, British Columbia (1), Donora, Pennsylvania (2), and Los Angeles (3).

Although little can be done to compensate for topography in existing centers, planning for growth and for future centers can minimize its effect. Meteorological conditions in the form of inversions, fogs, and extended periods of low wind velocity may cause accumulation of contaminants in a local area. These factors are especially important when considering the location of a new plant. In such cases, the plant design should consider not only the small community which may be nearby, but also the growth of the community right up to the very gates of the plant.

Kinds of Air Contaminants

In any study of air pollution in an industrial area, it is necessary to locate the principal sources of contaminants, and to seek the most economical method for reducing the concentrations leaving each plant. The problem of contaminant concentration is usually divided into three parts, depending on the particle size of the contaminants (4), namely, dirt fall, aerosols, and noxious gases. Methods for sampling and determining concentrations of these three classes of contaminants have been described elsewhere (5, 6). Many of these methods have the objection that they determine the amount of contaminant present during only a very small portion of the 24-hour day. It is well known that these contaminant concentrations vary widely with the time of day and with different meteorological conditions.

Sources of Air Pollution

The systematic study of contaminants consists of three parts. These include the investigation of:

1. Their nature and source.
2. Their properties and concentrations at the source and in the polluted atmosphere.
3. Economic methods which may be used at the source to reduce the pollution.

There will be a great variation in the ease with which the nature and source of contaminants can be determined. If the number of plants is small, or the contaminant easily identified, this part of the problem will be simple. In highly industrialized areas, the problem becomes much more difficult. It will be necessary to use instruments and continuous recorders to measure the variation of contaminant concentration with time and variation in wind direction and other meteorological conditions. Spot checking for specific compounds under favorable meteorological conditions will play its part.

Dirt-Fall Measurements

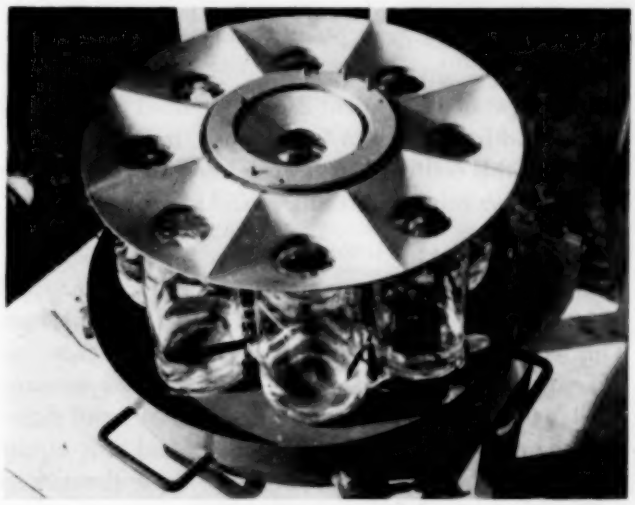
Clearly, it is important to obtain an integrated picture or a continuous record of the contaminant concentration in studying air pollution for a metropolitan area. Conventional dirt-fall measurements (8) are one of the methods available for this type of study. The usual method for these measurements is to expose a collection jar for 30 days and determine the amount and nature of the dirt which falls into it. There are many details to be considered if the measurements are to be reliable. Among them are:

1. Truly representative location of the jars.
2. Containers of the proper size, shape, and contour.
3. Consideration of surrounding conditions.
4. Proper methods of interpreting and presenting the results.
5. Consideration of the effect of local meteorological conditions, and many others.

This subject is too large to be considered here and will probably be the subject of future papers.

The simple dirt-fall jar indicates how much dirt has fallen at a location but gives no clue of the origin of the dirt. To fill this need, a directional dirt-fall collector has been developed by Battelle. It is shown in Figure 1. The dirt which falls while the wind is blowing from various directions is caught in one of the eight peripheral jars. Each jar catches the dirt-fall from only one of eight directions. When wind velocity is below three miles per hour, the dirt falls in the calm jar, in the center. An auxiliary wind vane controls the positioning of the cover so that it is always over one or the other of the sampling tubes. When the wind velocity is above three miles per hour, the outer tube is open; when it is below this velocity, the center tube is open. A more complete description of this instrument is given elsewhere (9, 10). Pilot models are giving satisfactory performance in the field.

It is also necessary to know the number of hours the wind blows from each direction in order to calculate the rate of dirt fall. A new directional wind-hour meter is being produced to furnish this information from direct-reading dials. This equipment should make it possible to correlate the direction of the wind with the highest rate of dirt fall. In addition, analyses of



With outer cover removed.

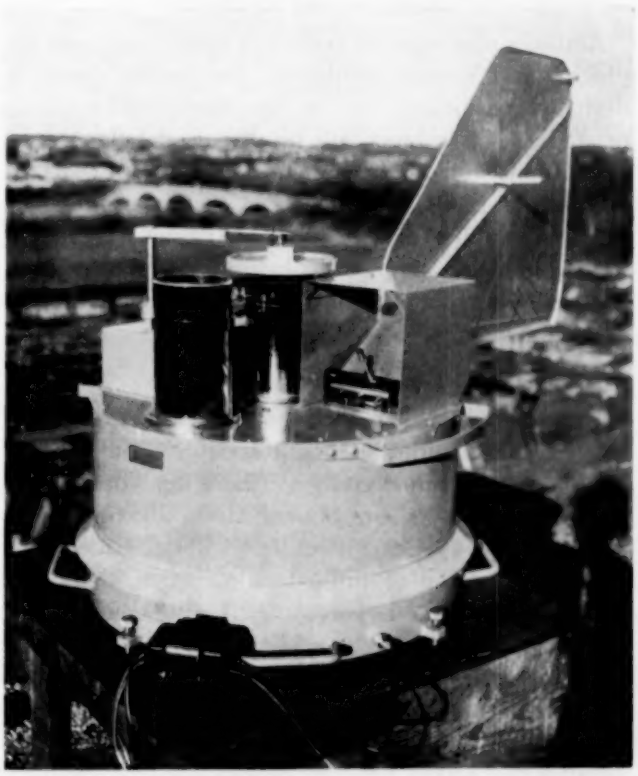


Figure 1. ***Directional dirt-fall collector. Lower photo shows operating position when wind is blowing in excess of 3 miles per hour.***

the dirt samples in various jars might give clues as to their sources.

Aerosol Determinations

Early determinations of aerosol concentrations were made in England by Owens (8) and in this country by Ward Davidson (11) of Consolidated Edison Electric Company. During the past several years, a number of continuous aerosol filters have been designed (12). All of these depend upon drawing a predetermined amount of air through a definite area of filter paper. The discoloration of the paper or its light transmission is used as a measure of the aerosol concentration.

This type of equipment has been used extensively in England for studies in their smoky, industrial areas. Its use in this country has been limited by the number of man-hours required to collect and interpret the data.

Aerosol Meter

An aerosol meter to sample the air and measure and record its aerosol concentration is in the design stages. This equipment could be made to differentiate between black, tarry aerosols and light-colored aerosols, similar to fly ash. Automatic recording of wind direction would be included. Development of this equipment could be carried forward rapidly if there were sufficient demand for it.

Impingers and Scrubbers

Aerosols may also be collected continuously in impingers and Venturi scrubbers. The methods may be designed to include use of the directional-sampling principle. This subject will be discussed below under "Determination of Gases".

These methods have not been widely used in air-pollution studies except in Los Angeles (3, 13). A high-volume air sampler has been developed for filtering aerosols from the air (23, 24). Samples may be collected over periods of 24-72 hours.

Determination of Gases

The gas which has received the most attention in air-pollution studies is sulfur dioxide. The Thomas Autometer is commercially available for continuously recording the concentration of sulfur dioxide in the atmosphere (4). An instrument (15) for measuring the concentration of sulfur-bearing gases, depending on their oxidation by bromine, is also commercially available.

In certain areas, effluent gases containing fluorides may be important. Instrumentation for continuously measuring fluoride concentration is under investigation by the ASTM Committee D-22 on Air Pollution.

Many other gases are important in specific locations. Unsaturated hydrocarbons have been shown to be important in Los Angeles (3, 17, 18). Gases and odors from chemical and food-processing industries are sometimes found objectionable. These problems are not sufficiently widespread to require that continuously recording instruments be developed.

In sampling gases or aerosols continuously, the directional principle could be employed if desired. To do this, nine sampling bottles are connected through solenoid valves to a vacuum pump. The solenoid valves are controlled by eight segments on a wind vane—one for each of the eight points of the compass. The ninth valve for calm periods or wind velocities below three miles per hour would be operated by a wind-velocity-sensitive vane. In this case, also, the wind-direction-hour meter would be required to correlate concentration with time elapsed. Similar results could also be obtained for gases by using a modified Thomas Autometer.

Short-Time Sampling and Analyses; Spot Checking Contaminant Concentrations

Standard methods are available for sampling aerosols and gases and for analyzing these samples for various chemical constituents (5, 6, 7). It is important that the particle size (14) and chemical nature (19) of the contaminant be known so that appropriate methods and techniques may be employed. For these data to have the maximum value, they should be correlated with meteorological parameters and topography.

One of the newer methods of sampling involves the use of kite-balloons (20) as shown in Figure 2. By

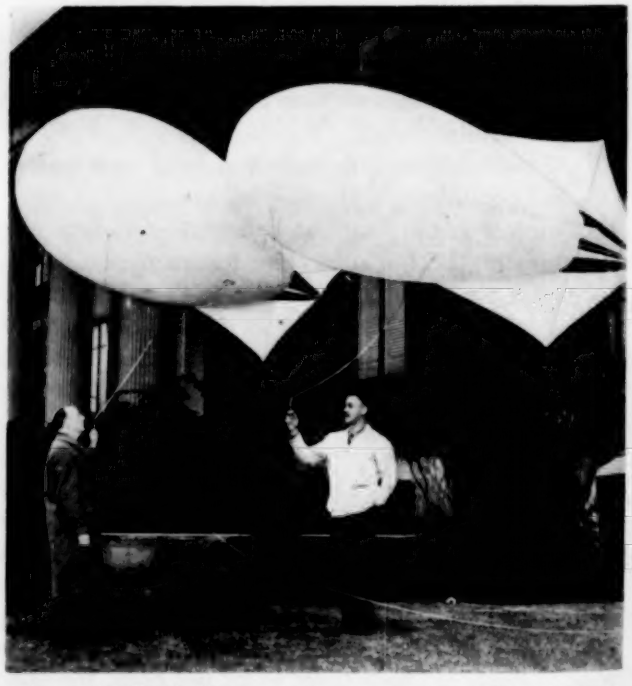


Figure 2. ***Kite-balloons used to support sampling devices and meteorological equipment at low altitudes.***

this means, polyethylene tubing may be raised to various altitudes to collect gas samples. These gas samples are drawn to ground level for analysis. Similarly, an electrostatic precipitator may be raised to various altitudes to collect samples of particulate matter. Meteorological data may also be collected by this technique. Wind velocity and direction are determined in the field by raising a hot-wire anemometer.

The kite-balloon technique has also been used to study the air-flow pattern over the top of industrial buildings under various meteorological conditions (9). The smoke from a smoke grenade, supported by a kite-balloon and fired at 235 feet, is seen in Figure 3.

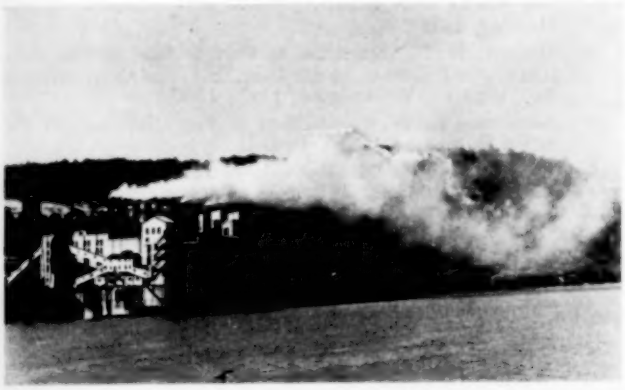


Figure 3. ***Smoke bomb released at 235 feet above ground. Wind velocity was 10 MPH.***

All of these techniques permit a study of the potential air-pollution problems of a new plant site before the shovel starts excavating for the building foundations. More detailed information concerning the use of these techniques is available in the literature (9,20).

Chemical Reactions in the Atmosphere

In some cases, the contaminant sought may be formed from a chemical reaction taking place in the air. The work of Haagen-Smit (17) and Blacet (18) at Los Angeles has indicated that the compound causing plant damage and acting as a lachrymator in Los Angeles was of this nature. Apparently, unsaturated hydrocarbons (such as are found in gasoline) may be oxidized to organic peroxides by sunlight in the presence of nitrogen oxide as a catalyst. Plant damage and lachrymators have been produced synthetically in plastic chambers under the same conditions and with the concentrations of these compounds which are present in the Los Angeles atmosphere. It may well be that organic peroxides formed under these same conditions are responsible for a part of the air pollution in some of our eastern cities.

Reducing Contaminant Level

Considerable progress has been made when the compounds responsible for the air pollution and their sources have been identified. It is necessary, then, to know the variations in concentration in the community from day to night, and with various meteorological conditions. This information should then be correlated with the amount of the contaminant being discharged into the air, the meteorological conditions, and the contaminant concentration which is found to be objectionable to the community.

Having identified the contaminant or contaminants and their sources, the level of air pollution in the community can be reduced only by studying each plant individually. The most economical method for reducing the contaminant level will be different for different plants and will depend upon many details.

In some cases, the contaminant will be separated from the effluent gases and disposed of as a separate operation. There are many methods for this purpose (21, 22); liquid washers, mechanical and centrifugal separators, both wet and dry, baghouses, and other filtration units, agglomerators, adsorption units, incineration units of various kinds, electrostatic precipitators, tall chimneys, and others. Among the most recent newcomers are special filter paper for very fine particles, steam condensation to increase the effective size of fine particles, and hightemperature baghouses. In many cases, research work has found a commercial use for the material separated.

When, in the manufacture of a product, the usual methods of reducing the contaminant concentration in the effluent gases are too costly, or do not give a satisfying result, it may be necessary to find a new manufacturing process. The new process, designed to include air-pollution prevention, may be more economical than the earlier process with gas-cleaning equipment added. Each plant presents a different set of conditions and must be studied individually to determine the most economical method.

Smoke Abatement and Fly-Ash Reduction

In many processes the quantity of contaminant can be drastically reduced by changes in operation or by means of inexpensive equipment to prevent formation of the offending substance. This is notably true of black smoke from boilers and furnaces. To a lesser but appreciable extent it is true of fly ash from coal-fired furnaces.

Almost all of the black smoke visible from chimneys of conventional equipment is unnecessary. Frequently, it is the companion of needless waste. Thus, although the abatement of smoke alone rarely pays for itself directly, the improvements in equipment and operation which often accompany the change can more than pay for the effort and investment expended.

In coal-fired equipment the initial formation of

smoke can be largely prevented by the use of jets of air or steam injected at high velocity immediately above the fuel bed. The resulting intense mixing of oxygen and combustible gases prevents cracking of the hydrocarbons which would form finely divided carbon, the principal component of smoke.

This is an old technique which frequently failed owing to poor application. Its use was not widespread nor generally accepted until the basic rules for successful application were developed in a project at Battelle, sponsored by Bituminous Coal Research, Inc. The result of this work has been made available in a number of technical publications (25, 26).

Overfire jets have also been shown to have an appreciable effect in reducing fly ash emitted from spreader-stoker-fired furnaces (27).

Community Phase of the Problem

Can a community legislate clean air? Obviously, the answer is "No". Passing a law alone will never produce clean air. Only by the cooperative efforts of industry, local government, and the community at large, can a reduction in contaminant concentration be obtained. Each segment must do its part. Both the citizens and industry must give the air-pollution-control officials their enthusiastic cooperation to make the program a success.

In carrying out a program to clean up the air, the public-relations portion of the program is very important. The public should be told what is being done by industry, and how much it is costing. This will help convince individuals of the importance of carrying out their part in the cleaner-air program.

Who pays for cleaning the air? It is evident that the public really pays for the cleaner air by paying higher prices. For this reason, the public has an interest in the efficiency of the cleaning system, and should not insist on unrealistic standards for industrial areas.

Maintaining Cleaner Air Standards

An important phase of future process development will be a study of the contaminant concentrations in the effluent gases and their dispersion in the air. In evaluating and comparing new processes, the cost of cleaning or purifying the effluent gases should be considered as part of the operating cost of each process.

In selecting new plant locations, consideration must be given to the handling of effluent gases to prevent air pollution in the community. This will include a study of the topography of the plant site and the meteorological conditions prevailing during various seasons of the year. Techniques for these studies are available. The farsighted industry will take advantage of them to minimize this type of trouble in the future.

Cleaner air will result only from cooperative community effort. Since the public pays for clean air, it must be realistic about the standards maintained in industrial areas. In planning new processes and plants, the farsighted company will consider air pollution and use modern techniques available for studying this problem.

BIBLIOGRAPHY

(1) Hawson, E. Wendell, and Gill, Gerald C., U.S. Bureau of Mines Bulletin 453.

(2) Schrenk, H. H., Heinmann, Harry, Clayton, George P., Gafafer, W. M., Wexler, Harry, "Air Pollution in Donora, Pa.", U.S. Public Health Bulletin No. 306, 1949.

(3) Larson, Gordon P., "Recent Identification of Atmospheric Contaminants in the Los Angeles Basin," Air Pollution and Smoke Prevention Association of America, Annual Meeting, 1951.

(4) Munger, H. P., "Spectrum of Particle Size and Its Relation to Air Pollution," First U.S. Technical Conference on Air Pollution, Washington, D.C., 1950.

(5) Silverman, Leslie, Proceedings of First National Air Pollution Symposium, p. 55, 1949.

(6) Test Procedures and Methods in Air Pollution Control, Air Pollution Control District, County of Los Angeles, California.

(7) Jacobs, Morris B., Analytical Chemistry of Industrial Poisons, "Hazards and Solvents," Interscience Publishers, Inc., New York, 1949.

(8) "Atmospheric Pollution in Leicester: A Scientific Survey," Air Pollution Research, Technical Paper No. 1, London, England, 1945.

(9) Munger, H. P., "Meteorological Methods for Studying Air Pollution," Presented at the XIIth International Congress of Pure and Applied Chemistry, New York, September, 1951.

(10) Munger, H. P., "The Engineering Approach to Cleaner Air for the Community," Presented at the American Public Health Association Meeting, San Francisco, California, November 2, 1951.

(11) Davidson, W. F., and Masters, Warren, Monthly Weather Review, *69*, p. 257, September, 1941; *70*, p. 225, October, 1942.

(12) Hemeon, W. C. L., "Automatic Instruments for Air Pollution Measurements," Presented at the Roanoke, Va., Meeting, Air Pollution and Smoke Prevention Association, May, 1951.
Chaney, A. L., and Hall, Stanley R., "Instrumentation for the Recording of Air Pollution Levels," Presented at the Roanoke, Va., Meeting, Air Pollution and Smoke Prevention Association, May, 1951.

(13) Second Interim Report (1949), Third Interim Report (1950), "The Smog Problem in Los Angeles County," Stanford Research Institute.

(14) Thomas, M. D., Ivie, S. O., and Fitt, T. C., "Automatic Apparatus for Determination of Small Concentrations of Sulphur Dioxide in Air," Industrial and Engineering Chemistry, Analytical Edition, *18*, p. 383, 1946.

(15) Washburn, H. W., Proceedings of the First National Air Pollution Symposium, p. 69, 1949.

(16) Pettit, A. B., Chemical Engineering, 58, p. 250, 1951.

(17) Haagen-Smit, A. J., "Chemistry and Physiology of Los Angeles Smog," Presented at the XIIth International Congress of Pure and Applied Chemistry, New York, September 13, 1951.

(18) Blacet, F. E., "Photochemistry in the Lower Atmosphere," Presented at the XIIth International Congress of Pure and Applied Chemistry, New York, September, 1951.

(19) Johnstone, H. F., Industrial Medicine and Surgery, *19*, p. 107, 1950.

(20) Munger, H. P., "Techniques for the Study of Air Pollution at Low Altitudes," Chemical Engineering Progress, *47*, p. 436, 1951.

(21) Welch, H. V., Metals Transactions, AIME, *185*, p. 934, 1949.

(22) "Clean Air—The Engineer's Way," Reprints from Power, July, 1949, to January, 1950 (14 articles in one reprint).

(23) Harris, W. B., and LeVine, H. D., "Some Techniques and Equipment for Trace Quantity Sampling of Industrial Aerosols," U. S. Atomic Energy Commission, NYO 1534.

(24) Private Communication, George Clayton, U. S. Public Health Service, Cincinnati, Ohio.

(25) Engdahl, R. B., and Holton, W. C., "Overfire Air Jets," Transactions. ASME, p. 741, 1943.

(26) "Application of Overfire Jets to Prevent Smoke in Stationary Plants," Aid to Industry 500-300, Bituminous Coal Research, Inc., Pittsburgh, 1951.

(27) Holton, W. C., and Engdahl, R. B., "Reduction of Dust Emission From Spreader-Stoker-Fired Furnaces," Transactions. ASME, p. 207, 1952.

o

RECENT PAPERS BY THE RESEARCH STAFF*

Plastics in Trace Element Research, Iris Dozer and Marjorie Dole. *Science*, January 25, 1952.

Low Melting Gallium Alloys, R. M. Evans and R. I. Jaffee. *Journal of Metals*, February, 1952.

Methods of Reducing Dust Emission From a Spreader-Stoker-Fired Boiler Furnace, W. C. Holton and R. B. Engdahl. *Transactions of the American Society of Mechanical Engineers*, February, 1952.

Cast Molybdenum of High Purity, G. W. P. Rengstorff and R. B. Fisher. *Journal of Metals*, February, 1952.

Electroforming Aluminum Waveguides Using Organo-Aluminum Plating Baths, W. F. Safranek, W. C. Schickner, and C. L. Faust. *Journal of the Electrochemical Society*, February, 1952.

**In most cases reprints are available upon request to the Editor.*

Printing on the March

by J. HOMER WINKLER

The author is a widely recognized authority on graphic arts technology, and currently serves as president of the International Association of Printing House Craftsmen. Mr. Winkler has published numerous articles of interest to printers and publishers and has served as guest lecturer at a dozen colleges and universities. Early in his career he was with the National Bureau of Standards in Washington. He joined the Battelle staff in 1944, where he now serves as a technical advisor.

THE printing and publishing (graphic arts) industry, with a history of more than 500 years, is today experiencing renewed vitality. Much of this stems from the many new technical developments which are influencing, or will influence, the production operations and future of every progressive printer and publisher.

One of the giants in our national economy, the printing and publishing industry recorded a sales volume of about $4,500,000,000 in 1951. According to the Census Bureau, the industry has about 30,000 establishments. These include photoengravers, type compositors, electrotypers, stereotypers, binders, newspaper and magazine publishers, packaging manufacturers, manufacturers of presses and other equipment, and many allied businesses.

The whole concept of how printing can be produced is being revised and broadened. It is natural for venture capital and investment funds to seek placement in such an aggressive industry. It is likely, of course, that the situation resulting from the mobilization effort may retard the rate of introduction of new developments.

The old concept that printing is largely confined to items for reading has become outmoded. Today printing is done on packages, plastic film, wall coverings, oil drums, and textiles. Even instrument dials, toy balloons, and walnuts are printed.

Letterpress, offset lithography, and gravure are the three most used printing processes today. They are constantly being improved. In addition, new cost-reducing production ideas are being introduced. The Fairchild Camera and Instrument Corporation has developed an electric "engraver" that will produce a halftone about the size of this page in twenty minutes. The celluloid halftone plate is made without employing a single material, machine, or process used previously. It would take hours to produce a similar plate in metal by conventional methods. The Fairchild engraver was first demonstrated about five years ago. More than 700 units are now in operation.

Equally revolutionary are the phototypesetting machines, the typographic copy machines, and the electronic color scanners.

The Intertype Corporation (Fotosetter) and the Mergenthaler Linotype Company (Linofilm) have machines that deliver a tape of film with type images on it. The conventional line-slug composing machines deliver a type-metal slug.

The Ralph C. Coxhead Corporation (Vari-Typer), Commercial Controls Corporation (Justowriter), and Fairchild (Lithotyper) now market keyboard-operated machines that deliver a typed copy in printers-type designs suitable for making printing plates. Note that none of these methods uses type metal in producing type composition.

The color scanners developed by Time, Inc., and the International Printing Ink Division of Interchemical Corporation make possible better and quicker production of plates for full color printing.

A unique and most fascinating post-war development is xerography. Developed by Battelle scientists, it is a rapid, completely dry method of printing and duplicating, of taking pictures, and of making or reproducing line drawings, documentary matter, or continuous-tone pictures. It can likewise be used in making X-ray pictures. It has definite possibilities as a production printing process, but these can only be realized after much more research.

More than a year ago the Haloid Company placed on the market the Xerox Copier, a photocopying machine—the first commercial utilization of xerography. Other promising applications for this remarkable process are nearing completion.

Printing by offset lithography has experienced an amazing growth within the past five or six years. The Keuffel and Esser Company has introduced presensitized sheet-plastic-surface offset plates. They are sufficiently low in cost so that they can be thrown away after a single use. Time, Inc., has developed a bimetal offset plate (Lithure) which reportedly has several advantages over the conventional albumin plate. "Dry

lithography" is getting much research attention. If a successful method of making plates for dry lithography is developed, it will add much to the volume of offset printing.

Many other interesting and promising developments in graphic arts are on the way.

All branches of the printing and publishing industry have supported this flood of new ideas. Trade associations like the Book Manufacturers' Institute, the American Newspaper Publishers Association and others have been active. The newspaper publishers have a yearly research budget of over $200,000 and are building a new laboratory.

Individual companies have their own programs. Crowell-Collier, at Springfield, Ohio, has long been a leader. R. R. Donnelley and Sons Company, the country's largest printer, maintains a formidable research staff. Time, Inc., which buys all its printing on contract, nonetheless operates its own research laboratory and has an annual research budget of about $1,500,000. More than a hundred other individual companies in the graphic arts are conducting effective research programs.

Alert to their opportunities, members of the industry band together to solve common problems and to share the cost of finding answers. Consequently, there are numerous organizations devoted to research and education. Examples are the Lithographic Technical Foundation, Inc., the National Printing Ink Research Institute, Gravure Research, Inc., and Printing Plates Research, Inc.

We have come to expect startling new developments from the printing and publishing industry. Since World War II it has experienced improvement in techniques and competitive position which match any in American business.

With this great industry's current resurgence of War II it has experienced improvements in techniques we can expect many more new and startling changes.

☼

The achievement of higher standards of living depends basically on the combined influence of the following factors: (1) natural and human resources; (2) scientific discoveries and inventions; (3) engineering applications; (4) business organization and management; (5) the economic system; (6) the governmental system. Scientists, inventors, engineers, business managers, and professional students of economics and government are in the final analysis cooperating in a common objective—that of increasing the capacity of the people to satisfy their wants.—*Brookings.*

☼

Industrial science can look forward to expanded cooperation among industries and among nations. The results should include better standards of living, more equitably distributed raw materials, and a peace-promoting freedom from want.—*Frank C. Croxton.*

BATTELLE TECHNICAL REVIEW ABSTRACTS

SECTION INDEX

AGRICULTURAL RESEARCH 194a
Plant and animal nutrition; insecticides; fungicides; fertilizers; weed control; soils; etc.

ANALYSIS—CHEMICAL AND PHYSICAL 154a
Methods and apparatus for qualitative and quantitative determination of the composition of matter.

APPARATUS, METHODS, AND STANDARDS 157a
Industrial measurement, inspection, and control; laboratory equipment and procedures (except when auxiliary to other subjects); standards and specifications.

CERAMICS 170a
Abrasives; inorganic cements; glasses; ceramic coatings; structural clay products; refractories; whitewares.

CHEMICAL TECHNOLOGY 175a
Chemical engineering and process equipment; chemistry of materials such as wood, paper, textiles, and coal and petroleum by-products; petroleum refining.

CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL 178a

CHEMISTRY—ORGANIC 185a

CLEANING, FINISHING, AND COATINGS—METALLIC 141a
Buffing and polishing; chemical and electrochemical cleaning and coatings; diffusion, dip, oxide, sprayed, weld-deposited, and vapor-deposited coatings; cladding.

CORROSION 152a
Theory, measurement, and prevention (except by means of coatings).

DESIGN 173a
Design of parts, equipment, and structures (except when auxiliary to other subjects); theoretical stress analysis.

ELECTRICITY AND ELECTRONICS 199a
Electrical and electronic theory, circuits, equipment, and applications (except when auxiliary to other subjects).

FOUNDRY PRACTICE 135a
Melting; casting; pouring; rigging; shakeout and trimming; molding; core and pattern making; metallurgical control.

FUEL TECHNOLOGY 166a
Solid, liquid, and gaseous fuels—their properties and combustion; carbonization, liquefaction, and gasification of solid fuels; synthetic fuels. (For combustion in engines, see Section 21.)

GRAPHIC ARTS 203a
Printing and decorating processes, equipment, and materials; book manufacture; photography.

HEATING, DRYING, AND AIR CONDITIONING 168a
Space heating; cooling; humidification; materials drying and heating; equipment such as ovens, boilers, furnaces, heat pumps, and auxiliaries.

LUBRICATION AND FRICTION 172a
Lubricants and lubricating methods; friction fundamentals; nonmetallic bearing materials; oil filtration; lubricating-system design.

METALLOGRAPHY AND PRIMARY STRUCTURES 144a
Microscopy, diffraction methods and other techniques; phase diagrams; nuclear and crystal structures; microstructures; macrostructures. (For structures resulting from transformation or deformation see Sections 11 and 13, respectively.)

METALS—FABRICATION AND USES 163a
Miscellaneous fabrication procedures; applications of metals, alloys, and specific processes.

SECTION INDEX (Continued)

METALS—MECHANICAL PROPERTIES AND TESTS 149a
Elasticity and plasticity; stresses and stress analysis; fracture; creep; shear; hardness; fatigue; wear resistance; deformation structures.

METALS—PHYSICAL PROPERTIES AND TESTS 147a
Mass, thermal, thermodynamic, chemical, electrical, magnetic, and optical properties.

METALS—PRIMARY WORKING 136a
Preparation for working; forging; rolling; extrusion; swaging; tube making; wire and rod drawing; slitting, sawing, shearing, etc.

METALS—SECONDARY WORKING 137a
Drawing; impact extrusion; forming; stamping; machining and machinability; grinding; honing and lapping; strain hardening; shot peening; flame cutting.

METALS—SMELTING, REDUCTION, AND REFINING 132a
Smelting and reduction of ores; distillation of metals; electrolytic winning and refining; thermit processes; cementation; amalgamation; carbonyl, halide, and hydride processes; ingot practice.

METALS—THERMAL TREATMENT 140a
Homogenization; annealing; normalizing; patenting; quench, precipitation, and case hardening; tempering; stress relief; cold treatment; heating and cooling media. (For effects of thermal treatment, see Sections 11, 12, and 13.)

METALS—TRANSFORMATIONS AND RESULTING STRUCTURE 146a
Diffusion; nucleation and grain growth; recovery and recrystallization; allotropic transformations; precipitation; eutectoid reactions; other solid-state reactions; liquid-phase reactions; solid-liquid, vapor-solid, and vapor-liquid reactions.

METALS—WELDING OR JOINING 138a
Welding; soldering; brazing; weldability and weld tests; bonding metals to nonmetals; adhesive bonding; mechanical fastening.

MISCELLANEOUS 205a
Research and research organizations; general metallurgical articles; mathematics; medical research; patent law; other unclassified subjects.

ORE AND MATERIAL BENEFICIATION 131a
Preparation and concentration of solid materials; roasting; calcining; sintering; nodulizing; briquetting; mineralogy.

PAINTS, VARNISHES, LACQUERS, AND ENAMELS 193a
Organic and inorganic coatings (except ceramic coatings); their composition, properties, application, and testing.

PHYSICS 195a
Theory and practice (except as covered in other sections). Includes aerodynamics; biophysics; flow of gases and liquids; deformation of solids; heat transfer; nucleonics; semiconductivity and superconductivity; ultrasonics; etc.

PLASTICS AND HIGH POLYMERS 188a
Polymerization; properties; testing; processing methods and equipment; compounding. (Does not include rubbers and surface-coating resins.)

POLLUTION AND WASTES 165a
Sampling, analysis, collection, prevention, and treatment of gaseous and liquid wastes, including smoke, fumes, odors, fly ash, dusts, aerosols, sewage, and industrial wastes; by-product recovery; meteorological, topographical, and biological effects.

POWDER METALLURGY 138a
Powder production and properties; mixing; compacting; sintering; post-sintering operations.

PRIME MOVERS 169a
Reciprocating engines; turbines; jet engines; rockets; locomotives; auxiliary equipment; power from atomic fission.

RUBBERS AND OTHER ELASTOMERS 192a
Polymerization; properties; testing; processing methods and equipment; compounding.

STATISTICS AND ECONOMICS 204a
Natural resources; supplies; production and cost data; articles on economic trends.

BATTELLE TECHNICAL REVIEW

Volume 1, Number 3

ABSTRACTS†

March 1952

1. ORE AND MATERIAL BENEFICIATION

2353 Production of a Hafnium Concentrate by Adsorption. Gerhard H. Beyer, Alfred Jacobs, and Richard D. Masteller. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 825-827.

A process was develoepd for cencentrating Hf from a naturally-occurring feed material containing 2 wt. % hafnium oxide (based on Hf and Zr content) to an approximately 90 wt. % hafnium oxide in two cycles, involving adsorption and differential stripping with mineral acids at room temperature. Approximately 70% of the original Hf adsorbed can be recovered as high-Hf concentrate.

2354* Cobalt From Roasted Pyrites. (In German.) K. Horalek. *Angewandte Chemie*, v. 63, Nov. 21, 1951, p. 525-527.

Describes briefly the procedure of extracting the Co from iron ore. Data, charted and tabulated, show that Co production varies greatly with time and country and that the Co content of iron ores varies greatly with source. 10 ref.

2355* U. S. A. Exploits Low Grade Iron Ore. R. H. Warring. *British Steelmaker*, v. 13, Jan. 1952, p. 19-21.

Discusses pelletizing procedures at Beaver Bay, Minn., plant now being constructed.

2356 Ore Companies Look Ahead to Ample Supplies. *Business Week*, Jan. 26, 1952, p. 124-127.

Discusses future sources of iron ore. Improved techniques in the use of this ore are surveyed.

2357* Coal Preparation and Its Relationship to Mineral Dressing. E. Swartzman and L. E. Djingheuzian. *Canadian Mining Journal*, v. 73, Jan. 1952, p. 51-57.

The objects and potentialities of coal preparation are stated and its place in the national economy defined. The various stages in coal preparation are discussed and their relationship to mineral dressing shown. Present-day trends in coal preparation are outlined. (To be continued.)

2358* The Effect of Variations in the Moisture Content on the Float and Sink Analysis of Large Coal. W. H. D. Savage and B. van Eck. *Journal of the Chemical, Metallurgical, & Mining Society of South Africa*, v. 52, Oct. 1951, p. 77-85.

Above effects are shown to be large for large size fractions. Shows that it is desirable to standardize the moisture content of samples to be tested by float-and-sink methods. The simplest method of doing this is to keep the samples under water or in an atmosphere saturated with water vapor.

2359 Compact Plant-Quality Coal. *Coal Age*, v. 57, Feb. 1952, p. 103-105.

Describes how Hart & Hart washes No. 11 seam coal with concentrating tables for small sizes, heavy media for plus ¾-in. sizes, maximum recovery of magnetite, and minimum use of fresh water.

2360* New Optical Methods for Determining Heavy Minerals. (In German.) H. Schumann. *Erdöl und Kohle*, v. 4, Nov. 1951, p. 684-687.

Describes a combination conoscopic and rotating-stage method of investigating heavy minerals. Shows that the proposed method combines advantages of the two methods without including the difficulties of each. Includes illustrations and tables. 19 ref.

2361* Modern Screening Machines for Processing Coal. (In German.) W. Kluge. *Erdöl und Kohle*, v. 4, Nov. 1951, p. 705-711.

Discusses various factors to be considered in designing a screening machine and describes several modern designs. Tables, graphs, diagrams, and photograhs.

2362 Size Reduction. Lincoln T. Work. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 91-94.

Annual review. 73 ref.

2363 Extraction of Sulfur From Sulfur Ores. N. P. Ekonomopoulos. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 105-106.

Describes development of method satisfactory for ores found on the island of Milo, off the coast of Greece. The extracting medium is gas oil.

2364 Vanadium Recovery From Chromate Liquors. T. S. Perrin, J. N. Jenkins, and R. G. Banner. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 401-404.

Describes a method for the above. Data are tabulated.

2365* Comparative Laboratory Tests With Jaw Crushers. (In Swedish.) Sture Mörtsell. *Jernkontorets Annaler*, v. 135, no. 9, 1951, p. 529-552.

Comparative crushing tests in a Dodge laboratory crusher and in a full-scale Blake jaw crusher were made with a number of different materials with varying characteristics. In some cases the comparison was extended to include tests on a single-toggle crusher. The method of testing is described in detail.

2366 The Extraction and Refining of Germanium and Gallium. A. R. Powell, F. M. Lever, and R. E. Walpole. *Journal of Applied Chemistry*, v. 1, Dec. 1951, p. 541-551.

Sources of Ge and Ga are discussed and descriptions are given of proccesses for recovery of these elements from flue dusts and from germanite.

2367 Manganese Extraction by Carbamate Solutions and Chemistry of New Manganese Ammonia Complexes. Reginald S. Dean. *Mining Engineering*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 55-60.

The widespread occurrence of Mn in low grade oxide and carbonate ores not amenable to mechanical concentration has led to extensive investigations of hydrometallurgical methods for producing a pure Mn compound suitable for further treatment. Describes a process based on use of a new group of aqueous

†Prepared from books, journals, and other material received by the Battelle Memorial Institute Library.

1. *Ore and Material Beneficiation*

Mn-NH_3 complex solution, which permit rapid solution of MnO to concentration of 80-100 g. Mn per l. and from which a fully crystalline, easily filtrable $MnCO_3$ is precipitated by the addition of CO_2 and partial NH_3 removal. This process was tested extensively on a wide variety of ores; and good extraction and recovery was obtained. Phase diagrams and tabulated data. 10 ref.

2368 Frothing Characteristics of Pine Oils in Flotation. Shiou-Chuan Sun. *Mining Engineering*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 65-71.

Presents the design and operation of a frothmeter capable of measuring the frothing characteristics of pine oils and other frothing reagents. Factors affecting the frothability of pine oil are summarized. Results show that relative frothabilities of pine oils in the frothmeter generally correlate with those in actual flotation, provided that other factors are kept constant. In addition to pine oils, other well-established flotation frothers were tested. Data are charted and tabulated; apparatus is diagrammed. 12 ref.

2369 Adsorption on Quartz, From an Aqueous Solution, of Barium and Laurate Ions. A. M. Gaudin and C. S. Chang. *Mining Engineering*, v. 4, Feb. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 193-201.

Adsorption was measured for barium ion and laurate radical, using radioactive tracers, over a wide range of concentrations. Laurate adsorbed in absence of barium fails to float. With barium, flotation-effective laurate coatings need not exceed 5% of a monolayer. 21 ref.

2370 Cheaper and Improved Methods of Beneficiating Lower Grade Ores Was Target in 1951. Raymond E. Byler. *Mining Engineering*, v. 4, Feb. 1952, p. 149-155.

Reviews the above. Grinding, screening, and materials handling techniques are discussed. Improved methods and machines are described.

2371 On the Emulsification of the Flotation Reagents by Means of Ultrasonic Waves. (In English.) Tadashi Oyama and Sakae Tanaka. *Science Reports of the Research Institutes, Tohoku University*, Ser. A, v. 2, Dec. 1950, p. 925-927.

Features of above investigation can be summarized as follows: Time required can be reduced, so that efficiency of flotation is increased; recovery of the ore can be increased; and high selectivity for differential flotation will be expected with lower consumption of the flotation reagents.

2372* Application of Flotation and Other Separatory Practices to Nonmetallics. James A. Barr, Jr. *Rock Products*, v. 55, Jan. 1952, p. 167-169, 197-199.

Describes how the above principles are applied to phosphate, potash, silica, feldspar, beach sands, and other minerals requiring high purity.

2373* Choice of Industrial Methods of Enriching Glass Sands. (In Russian.) I. B. Shlain. *Steklo i Keramika*, v. 8, Mar. 1951, p. 3-6.

The requirements of sand benefication are outlined. Various methods of treating the raw sands are described and discussed.

2374* Benefication of Ores by Nuclear Methods. Antoine M. Gaudin, Frank E. Senftle, and Wilfred L. Freyberger. *Technology Review*, v. 54, Jan. 1952, p. 143-144.

Describes how artificially induced radioactivity is being investigated as a means of mineral separation.

Miscellaneous Publications

2375 Mathematical and Physical Relationships in the Sintering of Iron Ores. M. Hansen. Henry Brutcher, Translation 2665, 17 pages. (From *Archiv für das Eisenhüttenwesen*, v. 21, Jan.-Feb. 1950, p. 9-12.)

Previously abstracted from original.

2376 Concentration of Oxide Manganese Ores From Black Rock, Kramer, and Morgan-Cromar Properties, Tooele and Juab Counties, Utah. J. V. Batty and R. Havens. U. S. Bureau of Mines, Report of Investigations 4818, Jan. 1952, 17 pages. (TN21 Un3r)

Investigation on the above showed that Morgan-Cromar ores are amenable to concentration by ore-dressing methods, although high recoveries were prevented by the intimate Mn-Si association. Data are tabulated.

2377 Processes for Recovering Vanadium From Western Phosphates. Lloyd H. Banning and R. T. C. Rasmussen. U. S. Bureau of Mines, Report of Investigations 4822, Dec. 1951, 44 pages. (TN21 Un3r)

Describes the above. 33 ref.

2378 Investigation of Kasna Creek Copper Prospect, Lake Kontrashibuna, Lake Clark Region, Alaska. U. S. Bureau of Mines, Report of Investigation 4828, 10 pages, Dec. 1951. (TN21 Un3r)

Reports on the above. The ore-dressing tests made on the samples included gravity concentration with a spiral, magnetic separation, and flotation.

2379 Nodulization and Pelletization of Fluorite Flotation Concentrates. H. Kenworthy. U. S. Bureau of Mines, Report of Investigations 4829, Dec. 1951, 13 pages.

Describes studies of nodule- and pellet-making methods. Evaluate some binders in order to provide technical data and furnish possible outlets for a future, larger-percentage production of finely divided metallurgical fluorspar, chiefly in the form of flotation concentrates. Data are graphed and tabulated.

2380 Preparation Characteristics of Coal From Somerset County, Pa. William L. Crentz, A. L. Bailey, and J. W. Miller. U. S. Bureau of Mines, Report of Investigations 4834, Dec. 1951, 23 pages. (TN21 Un3r)

Describes above, obtained by use of float-and-sink data. Washing characteristics of various coals are graphed.

2381 Benefication of High-Iron Arkansas Bauxite Ore. W. A. Calhoun, H. E. Powell, and J. F. Hodshire. U. S. Bureau of Mines, Reoprt of Investigations 4841, Jan. 1952, 12 pages. (TN21 Un3r)

In the laboratory investigation of 4 high-Fe bauxite samples, a concentration method was developed whereby all of the Al_2O_3 contained could be recovered as abrasive-grade and metal-grade bauxite. The procedure consists of a short (10- to 15-min.), low-temperature (400-450°C.) oxidizing roast, followed by high-intensity magnetic separation. Subsequent grinding of the magnetic reject to −65 mesh, followed by low-intensity wet magnetic separation gives an improved metal-grade bauxite and an Fe concentrate of potential value. Data are tabulated.

2382 Concentration of Oxide Manganese Ore From Doyle-Smith Claims, Northern Yuma County, Ariz. A. O. Ipsen and H. L. Gibbs. U. S. Bureau of Mines, Report of Investigations 4844, Jan. 1952, 6 pages. (TN21 Un3r)

Describes methods used in the above. Results are tabulated.

2383 The Utilization of Low Grade Domestic Chromite. K. W. Downs and D. W. Morgan. Canada Department of Mines and Technical Surveys. Memorandum Series 116, Oct. 1951, 54 pages.

Summarizes pertinent data regarding Canadian and North American reserves of chromite ores, their quality, and possible uses (metallic and nonmetallic), and methods suggested for their beneficiation. Also includes production of the metal from the concentrates by various methods, to enable investigation of the background and authority for the important statements. Numerous tables and graphs.

See also:
2411 (iron-ore resources and their composition effects)
2861 (hydrocyclones in ore benefication cyclones)
3097 (magnetic separation of Fe from enamel materials)

2. METALS—SMELTING, REDUCTION, AND REFINING

2384* Technology of Magnesium Production. (In German.) W. Moschel. *Angewandte Chemie*, v. 63, Sept. 21, 1951, p. 385-395.

Reviews present status of electrolytic and thermal production

of Mg in Germany and the U. S. The economically most successful electrolytic methods are shown to differ in choice of raw material, preparation of charge, and design of electrolytic cell. Includes illustrations, graphs, and tabulated data. 78 ref.

2385 Should the Steel Industry Move Closer to Liquid Charging? John O. Griggs. *Blast Furnace and Steel Plant*, v. 40, Jan. 1952, p. 51-57.

Describes and discusses above system and its advantages. Considers advantages of the dry-bottom tilting furnace over the stationary furnace. Recommends top charging of openhearth furnaces. Schematic diagram shows design for top charging. Tables and graph show world reserves of iron ore and coal, and coal-carbonization statistics.

2386 High Top Pressure Operation or Burden Preparation. A Survey of Differences in Blast Furnace Practice in the United States and Britain. D. D. Howat. *Blast Furnace and Steel Plant*, v. 40, Jan. 1952, p. 71-76.

Includes tables and illustrations.

2387 Transverse Ingot Cracks. Norman F. Dufty. *Blast Furnace and Steel Plant*, v. 40, Jan. 1952, p. 91-94, 130-131.

Discusses above ingot defects, their causes and prevention. Causes are believed to be primarily in the steelmaking process, rather than in subsequent working operations. Effects of mold design, pouring practice, and steel composition and temperature are discussed. 11 ref.

2388 Porous Steel. *Business Week*, Jan. 19, 1952, p. 89-90.

Outlines process developed by Ontario Research Foundation which turns out parts with any desired density from 92 to 453 lb. per cu. ft. Instead of pouring a molten metal into a mold, impurities like silica are first removed from the ore, leaving only pure iron oxide particles which are ground to a fine size. Then the ore is poured into porous molds, and ore and molds are placed in a ceramic crock, which is then filled with coke and limestone. The crock is put in a furnace and held at 2000°F. for several hours. Result is a part with a cellular structure.

2389 How Much Can Oxygen Do? *Business Week*, Feb. 2, 1952, p. 46, 48, 51.

Discusses the role of O_2 in steelmaking. Illustrated.

2390* Olivine as a Source of Magnesium. Norman Ketzlach and R. W. Moulton. *Trend in Engineering at the University of Washington*, v. 4, Jan. 1952, p. 21-24. (Condensed from thesis of Norman Ketzlach.)

Shows that olivine may be leached with HCl and NH_4Cl or $CaCl_2$ and acid to give a solution containing a much higher percent Mg than found in olivine ore. Using CaC_2 as reducing agent, yield was found to increase with increase in time, temperature, and fineness of the charge. 10 ref.

2391 The Reduction Equilibria of Zinc Oxide and Zinc Silicate With Hydrogen. J. A. Kitchener and S. Ignatowicz. *Transactions of the Faraday Society*, v. 47, Dec. 1951, p. 1278-1286.

An improved method for studying equilibria between solids and gases at high temperature was developed. Measurements were made in the range 750-1000°C. The results lead to values of free energy, heat, and entropy of formation of ZnO and Zn_2SiO_4 which are in good agreement with values calculated from other thermochemical data. 11 ref.

2392* Use of the Triplex Process in a Steel Foundry. (In French.) *Fonderie*, Dec. 1951, p. 2742-2746.

Discusses the above process which consists of using a cupola, a small acid converter, and a basic arc furnace for producing steel. Data are tabulated.

2393* The Development of the Small Bessemer Steel Plant from Its Beginning to the Present Day. (In German.) H. Wolff. *Giesserei*, v. 38, Nov. 1, 1951, p. 565-572.

Reviews the history of the small Bessemer converter and other small converter types, such as Clapp-Griffith, Walrand-Delattre, Robert, Tropenas, and Zenzes. Efforts at basic steel production in small converters and the introduction of multiple processes are discussed.

2394 Oxygen as a Means of Increasing Bessemer Production. III. W. G. McDonough. *Industrial Heating*, v. 19, Jan. 1952, p. 71-72, 74, 76, 78, 80.

The general effect of the oxygenated blast on converter slags and bessemer steel quality is considered. Other important topics include blowing time, flame appearance, and converter bottoms and linings. Presents conclusions as to the use of O_2 in acid bessemer converters.

2395* The Production of Pure Cerium Metal by Electrolytic and Thermal Reduction Processes. P. M. J. Gray. *Bulletin of the Institution of Mining and Metallurgy*, Jan. 1952; *Transactions*, v. 61, pt. 4, 1951-52, p. 141-170.

Production of pure Ce by electrolytic reduction of its fused trichloride and its dioxide dissolved in a bath of fused fluorides and thermal reduction of the trichloride and trifluoride are described. Graphs and tables. 36 ref.

2396 Direct Reduction Yields Variable Density Steels. P. E. Cavanogh. *Iron Age*, v. 169, Jan. 24, 1952, p. 63-68.

Discusses a process for producing useful articles of carbon or alloy steel directly from iron ore. The main characteristics are low cost and a wide choice of weight and strength. Fine, prepared ore or mill scale is reduced with coke and limestone in a continuous kiln, yielding plain carbon or alloyed steel. Bars, slabs, pipe, and other shapes have been produced with densities of 1.0-7.2 g. per cc. Graphs and tables show physical and mechanical properties.

2397 Direct Reduction Yields Variable Density Steels. Part II. P. E. Cavanagh. *Iron Age*, v. 169, Jan. 31, 1952, p. 108-111, 114.

Describes how a pipe was made by rushing a mold through the kiln—and then dumping out unreduced ore in center. Hot-swaged bar (of mill scale) has same density and properties as steel of same analysis. One piece can have different chemistries and properties.

2398 Oxy-Natural Gas Hot-Top Heating Increases Ingot Yield. A. J. Texter and E. F. Kurzinski. *Iron Age*, v. 169, Feb. 14, 1952, p. 126-128.

The latest, and possibly the best, answer to the old problem of hot-top size is heating with oxy-natural gas. High-alloy and stainless-steel ingots are now being poured using this standardized method with no bad effects on steel quality. The practice is simple and quick and no water cooling of burner is necessary.

2399 Discussion of the Axial Compressor for Blast Furnace Blowing. *Iron and Steel Engineer*, v. 29, Jan. 1952, p. 79-84.

Covers paper by W. O. Lowell. (Oct. 1951 issue.)

2400 Comparative Economics of the Electric Furnace and Open Hearth. H. W. McQuaid. *Iron and Steel Engineer*, v. 29, Jan. 1952, p. 85-93; disc., p. 93-95.

An investigation of the economic problems involved in the selection of steelmaking furnaces.

2401* Use of Oxygen Carbon Dioxide Instead of Air in the Final Stage of the Basic Bessemer Process. (In Swedish.) Bo Kalling, Folke Johansson, and Lennart Lindskog. *Jernkontorets Annaler*, v. 135, no. 10, 1951, p. 557-572.

Describes results of a number of experimental blows in a 14-ton basic Bessemer converter, in which the charges were dephosphorized with O_2/CO_2 instead of air in order to reduce the nitrogen content of the product. It was reduced to about 0.006% in the finished steel, as against about 0.012% by normal air blows. A further reduction to 0.003-0.004% was found to be possible by using oxygenated air for the preliminary blowing. Equal parts of O_2 and CO_2 produced approximately the same temperature conditions as air-blowing but the blowing time was slightly shortened. There was no apparent increased injury to the converter bottom. Another advantage of final blowing with O_2/CO_2 is that pouring temperature can be adjusted to that most suitable for the mode of pouring and the quality of the steel. 20 ref.

2402* Application of Statistical Methods. G. F. Komlosy. *Journal of the Birmingham Metallurgical Society*, v. 31, Dec. 1951, p. 178-192.

Discusses the above in a steel works. Some practical examples

2. *Metals—Smelting, Reduction, and Refining*

of these methods such as distribution of weights of steel blocks and an investigation into certain drop-forging qualities are given.

2403* Contribution to Knowledge Concerning Aluminum Electrometallurgy. (In French.) *Journal du Four Électrique et des Industries Électrochimiques*, v. 60, Nov.-Dec. 1951, p. 143-144.

A brief study of the equilibria of cryolite-alumina melts is presented. Includes graphs.

2404 Melting Low Carbon Stainless Steel. Walter Crafts and H. P. Rassbach. *Journal of Metals*, v. 4, Jan. 1952, p. 20-25.

Determines slag and metal relationships for oxidation, reduction, and addition steps in melting and presents conclusions.

2405 A Survey of Zebra Roof Practice. C. E. Grigsby. *Journal of Metals*, v. 4, Feb. 1952, p. 132-139.

Describes the above. The zebra roof for openhearth furnaces comprises rings of either regular or super-duty silica brick, alternated with rings of basic brick in areas of greatest wear—along back or front skews, or both. Illustration.

2406 Silicon-Oxygen Equilibrium in Liquid Iron. Nevzat A. Gokcen and John Chipman. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 171-181.

Molten Fe-Si-O alloys in silica crucibles were brought into equilibrium with atmospheres of controlled H_2O/H_2 ratio, quenched in hydrogen, and analyzed. Rates of oxidation and reduction were studied in experiments lasting up to 16 hr. at 1600°C. The rate-determining part of the process is the transfer of oxygen from gas to metal or the reverse which, under the experimental conditions, was about 20% efficient. 21 ref.

2407 Mechanism of the Reduction of Oxides and Sulphides to Metals. Carl Wagner. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 214-216.

Discusses the above. Migration of metal over distances of several mm. was observed in the following reactions: reduction of silver sulfide by Cu; reduction of cuprous sulfide by Fe; and reduction of cuprous sulfide by cuprous oxide.

2408 Metallurgical Treatment of Swarf. E. R. Thews. *Metal Industry*, v. 79, Dec. 21, 1951, p. 521-524; Dec. 28, 1951, p. 535-538; v. 80, Jan. 4, 1952, p. 7-8, 10.

Discusses the above with respect to methods of handling and storing, preliminary treatment, and subsequent metallurgical treatment.

2409 Method of Recovery From Flue Dusts: Germanium and Gallium. F. M. Lever. *Metal Industry*, v. 80, Jan. 4, 1952, p. 3-4.

Discusses briefly, and gives a flow sheet of the process used for the recovery of Ge and Ga from producer gas-flue dusts.

2410 Ingot Manufacture. W. G. Mochrie. *Metal Industry*, v. 80, Jan. 25, 1952, p. 63-66.

Deals with nonferrous ingots. Reviews the subject from the standpoint of economic factors, competition with other industries, varying refining methods, plant, and practice. Particular attention is devoted to scrap-metal segregation.

2411 Behaviorism of Elements in Iron and Steel Making. Herbert W. Graham. *Metal Progress*, v. 61, Jan. 1952, p. 87-96.

Reviews the present iron-ore situation as it effects the above. Classifies the chemical elements in the raw materials as to their behavior in conventional iron- and steelmaking processes by assembling data on oxide stability combined with a summation of empirical experience. Graphs and tables show relation of behavior to location in the Periodic System.

2412 Researches on Nickel Matte. C. C. Downie. *Mining Journal*, v. 238, Jan. 4, 1952, p. 12-13.

Describes modification of smelting, converting, and matte refining procedure developed for application to ores containing a considerable amount of copper. An adaptation of the oxalic acid process and an electrorefining process are discussed.

2413* The Refractory Metals. L. F. Yntema. *Record of Chemical Progress*, v. 12, Fall 1951, p. 177-183.

Briefly discusses the problems of processing Cb, Ta, Mo, and W. Gives some of their uses in metallic form. Processes discussed include reduction and refining, powder metallurgy, and ceramic coatings for these metals; also their electrodeposition on nonrefractory metals.

2414* The Burner Ports of Openhearth Furnaces Fired With Coke-Oven-Gas. (In German.) Friedrich Wesemann and Wilhelm Schmitt. *Stahl und Eisen*, v. 71, Dec. 1951, p. 1413-1419; disc., p. 1419-1420.

Discusses design considerations of the above. Presents results of investigation of several furnaces with different gas-port dimensions and shape. Compares these with results of model experiments.

2415 Accurate Methods for Computing Electric Furnace Heats. R. B. Shaw. *Steel*, v. 130, Jan. 21, 1952, p. 72, 74-75.

Ways and means of assisting the melter in making calculations for the above in electric-furnace making of high-alloy or stainless steels are described. An example is worked out in complete detail.

2416 Desulphurization Worth Watching. William W. Austin, Jr. *Steel*, v. 130, Jan. 28, 1952, p. 76, 78, 80-81.

Investigation shows that desulfurization efficiency in blast furnaces is low. Discusses various ways for improving the process.

2417 Blast Furnace Practice. IV. Influence of Coke-Ash on Thermal Effects. V. Comparison of Operating Data. Charles E. Agnew. *Steel*, v. 130, Feb. 4, 1952, p. 98, 101-102, 104, 107, 110; Feb. 11, 1952, p. 97, 100, 102, 105, 108.

Discusses thermal economy in smelting operations and relationship between constituents of tapping slag and % ash in coke. Part V illustrates the method used for classifying slag by tetrahedrons. The 4 principal constituents of daily average slag analysis are first converted to the 100% composition, from which the tetrahedron for the day is determined by applying the analysis to the McCaffery diagram. Advantages of this method are given. (To be continued.)

2418* Gold Refining With Ripple Current From Rectifiers. (In German.) Julius Steiner. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Dec. 1951, p. 690-695.

Shows that rectified single-phase a.c. in a half-wave circuit has the same effect as a ripple current produced by superposition of a.c. and d.c. An attempt is made to express, by simple formulas, the electrolytic effects of the ripple-current curve. Includes tables, graphs, diagrams, and photomicrographs.

2419* Investigation of Aluminum-Silicon Alloys; A Contribution to the Silumin Problem. (In German.) Roland Mitsche and Emma-Maria Onitsch-Modl. *Zeitschrift für Metallkunde*, v. 42, Nov. 1951, p. 341-344.

Reviews the refining of Silumin on the basis of the literature, adding results of new investigations by the authors. The definite similarity between the structural development of eutectic Al-Si and Fe-C alloys makes the assumption of a similar mechanism possible. Implications are discussed. 14 ref.

Miscellaneous Publications

2420 Chemical and Physico-Chemical Principles of Deoxidation With Manganese, Silicon, and Aluminum. W. Koch, H. Wentrup, and O. Reif. Henry Brutcher, Translation 2809, 28 pages. (From *Archiv für das Eisenhüttenwesen*, v. 22, Jan.-Feb. 1951, p. 15-29; disc., p. 29-30.)

Previously abstracted from original. 13 ref.

See also:

2546 (electrodeposition of Cu)
2547 (electrodeposition of Cu)
2548 (concentration polarization during cu deposition)
2549 (Cu depositions in presence of gelatin)
2634 (solidification of steel ingots)
2802 (Cu-alloy scrap recovery)
2980 (reduction and purification of Zr)
3108 (refractory linings for openhearths)
3313 (reduction of sulfide ores)

3. FOUNDRY PRACTICE

2421* Casting Drop-Hammer Dies. *Aircraft Production*, v. 14, Feb. 1952, p. 59-64.

Methods recently developed by several companies in the U. S. for the proper use of new medium and high expansion plasters for close tolerance patterns and also for controlling solidification in the mold. Materials are Zn alloys, Al, and bronze. Diagrams, tabular data, and illustrations.

2422 Metallurgy of Shell Molding. B. N. Ames, S. B. Donner, and N. A. Kahn. *American Foundryman*, v. 21, Jan. 1952, p. 24-29.

Plastic-bonded shell molds have an insulating quality overlooked by many foundrymen. This factor, plus soundness, mechanical properties of shell cast metals, and other metallurgical factors studied at the New York Naval Shipyard are reported. Effects of various factors on macrostructures and mechanical properties are illustrated and described. Work was done on Al alloys, bronzes, gray cast iron, and cast steel.

2423 Side Risers Cut Cleaning Room Costs on Alloy Iron Castings. Roy Chamberlin. *American Foundryman*, v. 21, Jan. 1952, p. 33-36.

Tells how side risering of special alloy iron cut cleaning room costs and produced sound castings when top risering failed. Numerous schematic diagrams.

2424 Basic Cupola Operation. John P. Holt. *American Foundryman*, v. 21, Jan. 1952, p. 39-43.

Designed to aid the foundryman in overcoming difficulties involved in converting from acid to basic cupola operations, this article answers questions on advantages, applications, installation, operation, and maintenance.

2425 Gray Iron Fluidity Variables; Effect of Composition and Pouring Temperature. Lew F. Porter and Philip C. Rosenthal. *American Foundryman*, v. 21, Jan. 1952, p. 53-59.

A spiral test mold, modified to give a mean deviation of less than 2.0% in duplicate tests, was used to determine the effects of temperature and metal composition on the fluidity of cast irons. Part of the tests were conducted to provide data on the effects of individual elements, and also on the interrelated effects of the components. From the test data, a tentative formula was derived which makes possible the prediction of relative effects of analysis variations and pouring temperatures on fluidity of the iron.

2426 This Mold Wash Works With All Common Casting Alloys. R. E. Morey and C. G. Ackerlind. *American Foundryman*, v. 21, Jan. 1952, p. 67-70.

Practical trials show that a bentonite-dextrin-silica flour mold wash developed by the Naval Research Laboratory gives excellent performance with all common ferrous and nonferrous casting alloys, including steel, brass, bronze, Al, Mg, and cast iron.

2427 Gating Gray Iron for Production Foundries. James J. Silk. *American Foundryman*, v. 21, Feb. 1952, p. 41-42.

Outlines gating methods successfully used by the author for snap flask work and for heavy floor work using edge gates. Diagrams and tabular matter.

2428 Aircraft Magnesium Castings *Must Meet* Exacting Requirements. Herbert Chase. *Automotive Industries*, v. 106, Feb. 1, 1952, p. 40-43, 108.

Describes and illustrates the practices used by Howard Magnesium Foundry of Chicago on a Mg alloy known as ZRE-1 which contains small percentages of Zn, Zr, and rare earths. Outlines some of the mechanical properties of this alloy.

2429 Load-Deformation Curves on Dried Sand Specimens and Their Relation to Expansion Defects. R. G. Godding. *British Cast Iron Research Association Journal of Research and Development*, v. 4, Dec. 1951, p. 202-208.

Presents results of an investigation made to establish a relationship between the shape of stress-strain curves obtained for certain specimens of dried molding sand and the tendency of these sands to produce expansion scabs or buckles on the casting. Such scabs are due to the expansion the sand undergoes on heating. An apparatus capable of measuring the deformation of sand at all loads up to breaking load was developed, and this and the testing procedure are described in detail. Graphs and illustrations.

2430 New Foundry Techniques. Part 1. *Canadian Metals*, v. 15, Jan. 1952, p. 28-30.

Gives a discussion of advanced sand-reclamation systems, cleaning-room practices, new equipment and kindred foundry methods, and general consideration of problems posed by the pressures of the defense mobilization program.

2431 Hardened Gray Iron—An Ideal Material for Diesel Engine Cylinder Sleeves and Liners. Garnet P. Phillips. *Foundry*, v. 80, Jan. 1952, p. 88-95, 222, 224, 226, 228; Feb. 1952, p. 106-111.

Describes studies to determine the most desirable type of wear-resistant iron for use in cast cylinder sleeves and liners of diesel engines. Gives results of wear tests on various iron alloys and special steels. Includes physical properties, corrosion tests, and microstructures. Second part describes molding and melting practices in the casting of the above parts. Illustrations, graphs, and tables.

2432 Gates and Heads for Steel Castings. John Howe Hall. *Foundry*, v. 80, Jan. 1952, p. 102-105, 237-242; Feb. 1952, p. 98-99, 212, 214-216, 218-220.

Discusses factors to be considered in the application of the above. Methods of keeping the head molten to promote efficient feeding of the casting are also described. Discusses the use of blind risers with steel castings and explains one method of determining the size of the feeder head that should be applied to obtain a sound casting. (To be continued.)

2433 Cupro-Nickel Castings. James S. Vanick. *Foundry*, v. 80, Feb. 1952, p. 100-105, 246, 248, 250-253.

Presents a detailed survey on the above. Includes the effects of various additions, effects of heat treatments, and mechanical and physical properties. Practices in welding, brazing, and soldering are given. Use of Cu-Ni alloys are discussed. Graphs, tables, and illustrations.

2434 Develops Pressurized Cupola. Ernest F. Fisher. *Foundry*, v. 80, Feb. 1952, p. 152-154.

Describes the above. Advantages are cited. Diagrams. Author's organization is not indicated.

2435 A Reliable Leaded Bronze. Harold J. Roast. *Foundry*, v. 80, Feb. 1952, p. 117, 200-202.

Tells how long and successful experience with the alloy ASTM B30-49(3D) + 3% Zn recommend it for bearings and castings required to resist corrosion and internal pressure. Melting practice is discussed.

2436 Pressure-Tight Gunmetal Castings; Application of Research Results to Production Technique. L. Buckley and E. C. Mantle. *Foundry Trade Journal*, v. 91, Dec. 27, 1951, p. 727-729.

Describes some large-scale foundry trials which have been carried out to exploit the results of research of the British Non-Ferrous Metals Research Association on the control of porosity in gunmetal castings. Test bars were used to follow changes in the gas content of the metal. Use of test bars in this way is an important departure from the usual practice of casting test bars mainly for inspection purposes.

2437 Synthetic Resins in the Foundry. *Foundry Trade Journal*, v. 91, Dec. 27, 1951, p. 737-739.

Further discussion of T.S. 30 sub-committee report published in July 5 issue.

2438* Quantity Production of Spheroidal-Graphite Cast Iron. N. Croft. *Foundry Trade Journal*, v. 92, Jan. 3, 1952, p. 5-11.

Discusses development, technique in foundry organization, and production control of the Mg process for the above. Illustrated.

2439 Designing Components for Die-Casting. W. M. Halliday. *Foundry Trade Journal*, v. 92, Jan. 10, 1952, p. 37-43.

Sectional thickness of component; uniformity; parting lines; coring methods; threaded and plain holes; taper or draft; dimensional tolerances; and flash formation and removal are dealt with

3. *Foundry Practice*

in detail. General guidance is given as to the manner in which design may be interpreted and adjusted to give the most suitable form for die-casting, coupled with minimum cost of dies and parts. Casting alloys include Sn, Pb, Zn, Al, Mg, Cu.

2440 Basic-Lined Water-Cooled Cupola at Lynchburg Foundry. W. W. Levi. *Foundry Trade Journal*, v. 92, Jan. 10, 1952, p. 45-48.

Discusses use of the above, and states the iron suited for spun pipe can be produced in the basic cupola with little or no pig-iron, and with 50-70% steel scrap in the charge.

2441 Castings for a Small Diesel Engine. H. J. M. Conacher and R. Leeks. *Foundry Trade Journal*, v. 92, Jan. 17, 1952, p. 57-65.

Describes the production of the above in detail. Components were made of gray iron. Illustrations and micrographs.

2442 Some Present-Day Practices in Patternmaking. *Foundry Trade Journal*, v. 92, Jan. 17, 1952, p. 67-70.

Discussion of paper by B. Levy (July 19, 1951 issue.)

2443 Symposium on Vermiculite in the Foundry. *Foundry Trade Journal*, v. 92, Jan. 24, 1952, p. 89-92.

Vermiculite products are discussed in the following papers: "Nature and Uses," J. E. Laschinger; "For Ferrous and Non-Ferrous Castings," G. Butler; and "For Steel Castings," A. Hirst.

2444 Contraction and Blowholes. J. Leonard. *Foundry Trade Journal*, v. 92, Jan. 24, 1952, p. 95-98.

The theory of solidification of a casting is expounded. It involves liquid shrinkage, crust formation, and production of internal voids. Nomenclature is proposed and tentative definitions are given for various shrinkage phenomena. The net effect is quoted and illustrated by reference mainly to American work on the influence of various conditions on the incidence of porosity.

2445* Formation of Nodular Graphite in Cast Iron. (In German.) A. Wittmoser. *Giesserei*, v. 38, Nov. 1, 1951, p. 572-577.

Describes extensive research concerning the above as a result of Mg treatment. Graphs, photomicrographs, and schematic diagrams.

2446* Contribution to the Laws of Cupola Melting. (In German.) W. v. Preen. *Giesserei*, v. 38, Nov. 15, 1951, p. 598-600.

Proposes general formulas for the cupola process which may also be applicable to the general blast-furnace process. Dependence of the formula upon varying plant conditions is indicated.

2447 Vacuum Impregnation of Castings. L. W. Hull. *Journal of Metals*, v. 4, Jan. 1952, p. 30-32.

Vacuum impregnation of castings eliminates rejects under buyer's tests and insures against failure in service. Lists impregnating materials and methods. Describes in detail the method of vacuum impregnation followed by pressure.

2448 Gray-Iron Castings. T. E. Eagan. *Mechanical Engineering*, v. 74, Feb. 1952, p. 115-117.

Discusses rules of design necessary to achieve the desired mechanical and physical properties and a casting true to pattern and free from defects. Considers shrinkage rules, machining allowances, and internal stresses.

2449 Bauxite Pig Iron. *Metal Progress*, v. 61, Jan. 1952, p. 160. (Condensed from "Possibilities of Utilizing the Pig Iron Produced From Calcium-Aluminate Slag of Foundries," N. Hajto and F. Varga. *Journal of Mining and Metallurgy* (Hungary), v. 4(82), Nov. 1949, p. 483-489.)

Bauxite pig iron is low in sulfur (0.049-0.57%) and high in carbon (0.5-1.9%), therefore, its suitability as a raw material was investigated. Melting experiments were conducted in a 24-in. diameter cupola. Results of the experiments proved the suitability of this iron for manufacture of gray-iron castings.

2450* Die Castings and Investment Castings. E. N. Field. *Machinery* (London), v. 79, Dec. 27, 1951, p. 1130-1136.

Presents results of detailed investigation of relative merits of above two methods for production of a particular component —a small bevel gear. Also discusses advantages and disadvantages of the two processes in general terms. Considers alloys suitable for each. Schematic diagrams.

2451* Die Casting Die Design. Part. VI. H. K. Burton and James L. Erickson. *Magazine of Tooling and Production*, v. 17, Jan. 1952, p. 80, 82, 86, 90, 98, 102, 119.

Design of vents used in the above is discussed. Advantages and limitations of each are discussed. Schematic diagrams.

2452* Uniform Grain Structure Favors Permanent Mold Over Sand for Gray Iron Castings. *Precision Metal Molding*, v. 10, Jan. 1952, p. 26-27, 64.

Tells how De Walt, Inc., was able to get more uniform grain structure in gray-iron permanent-mold castings. High efficiency of die-cast Al rotors was also obtained.

2453 Impregnation Cuts Casting Porosity Rejects. *Product Engineering*, v. 23, Feb. 1952, p. 193.

Briefly discusses the above process which utilizes thermosetting copolymers.

2454 Fundamental Research on the Flowabilities of Melts of Metals and Alloys. I. On the Flowabilities of Sn-Bi and Pb-Sn Systems. (In English.) Tadashi Yanagihara. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 2, Dec. 1950, p. 843-855.

The above was investigated. The fluidity is based on primary crystallization and eutectic crystallization. Both increase the viscosity of melt, but the effect of the latter was shown to be less than that of the former. Micrographs.

2455 Centrifugal Castings of Ferrous Metals. C. D. Donoho. *SAE Journal*, v. 60, Jan. 1952, p. 60-67.

Presents a summary of experiences with the above as reported by the Executive Committee of the SAE Iron and Steel Technical Committee.

2456 Improved Forming Dies Perfected; Armour Research Develops Aid to Stampers. Thomas A. Dickinson. *Steel Processing*, v. 38, Jan. 1952, p. 25-26.

Discusses plaster patterns for casting constant-tolerance forming dies at an unprecedently-low cost.

See also:
2404 (melting low-carbon stainless)
2591 (casting of bearing)
2696 (brass foundry practice)
2963 (melting of steels for low-temperature service)
2979 (casting of Cu-Pb bearings)

4. METALS—PRIMARY WORKING

2457 Mill Will Speed Tapered Sheets. A. H. Langenheim. *Aviation Week*, v. 56, Feb. 4, 1952, p. 47-48.

Describes a new rolling mill which will mass-produce sheets up to 10 ft. wide for aircraft use, and cut time and chip wastage in slab milling. Application to Al alloys is described.

2458* Causes and Elimination of Deep-Drawing Defects With Consideration of the Deep-Drawing Testing Process. (In German.) Gerhard Oehler. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Oct. 1951, p. 576-577.

Discusses briefly facts presented in two tables with illustrations on the deep drawing of steel plates.

2459 Develop New Forging Techniques for Aircraft Parts. G. W. Papen and W. Schroeder. *Iron Age*, v. 169, Feb. 7, 1952, p. 135-138.

Describes techniques studied for forging of Al- and Mg-alloy aircraft outer skin panels. Parts are thin, and have integral stiffening ribs. Forgings with webs thinner than 0.1 in. have been made with draft angles as low as 1°. Areas of forgings are much larger than conventional practice would indicate the press could handle.

2460 Rolling Characteristics of Various Steels. Edgar M. D. Herold. *Iron and Steel Engineer*, v. 29, Jan. 1952, p. 55-59; disc., 60-61.

Describes the effects of alloying elements on the above. Includes diagrams and tabulated data.

2461 Automotive Drawing Compounds—Specifications and Applications. J. T. O'Reilly. *Lubrication Engineering*, v. 8, Feb. 1952, p. 14-17.

Emphasizes the practice of lubrication in press forming operations on low-carbon steel.

2462 Small Drop Forgings. H. A. Whiteley. *Metal Treatment and Drop Forging*, v. 19, Jan. 1952, p. 20-26.

The technique involved and the various important factors influencing the quality of the products are discussed, together with the preparation of dies and their heat-treatment, and the design of clipping tools. Some typical small forgings are illustrated.

2463 Hot and Cold Forging Methods. (Concluded.) C. W. Hinman. *Modern Machine Shop*, v. 24, Feb. 1952, p. 112-114, 116, 118, 120.

Describes the use of forging equipment in the manufacture of ordnance material from steel.

2464 An Examination of Modern Theories of Rolling in the Light of Rolling Mill Practice. (Continued.) N. H. Polakowski. *Sheet Metal Industries*, v. 29, Jan. 1952, p. 11-16.

Discusses various methods and apparatus for control of strip thickness. 16 ref. (To be continued.)

2465 What's Happening in the Forging Industry? John C. McComb. *Steel Processing*, v. 38, Jan. 1952, p. 20-21.

General discussion and table showing shipments of steel forgings in net tons for last 5 years.

2466* Locked-Coil Rope Production. *Wire Industry*, v. 19, Jan. 1952, p. 63, 65.

Describes processes involved in the above.

2467 The Fabrication of Copper Wire. Sidney Rolle. *Wire and Wire Products*, v. 27, Jan. 1952, p. 35, 37-47, 76-83.

Presents a chronological development of the use of Cu. Surveys various stages in the production of Cu wire, including ore concentration, smelting, refining, rod rolling, pickling, annealing, butt welding, and wire drawing. Numerous illustrations and diagrams. 3-page bibliography.

2468 Fine-Wire Resistors for Measuring and Control Purposes; Technical Principles and Production. (In German.) Otto Schultze. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Jan. 11, 1952, p. 43-47.

Discusses details of suitable materials, production, properties, methods of joining and insulating the wires, and some specific uses for them. Includes photographs, diagrams, and graphs.

Books

2469 Teoriia Prokatki (Obshchie Osnovy Obrabotki Metallov Davleniem.) [Theory of Rolling (General Basis of Forming Metals by Pressure.)] S. I. Gubkin. 602 pages. 1950. Government Scientific-Technical Publishing House for Ferrous and Nonferrous Metallurgy, U.S.S.R.

This book is intended as a textbook for students in the metallurgical trades, however it can be considered as a handbook of rolling and related processes. The question of plastic deformations is treated theoretically and is discussed in relation to many metallurgical factors. (From extensive summary by S. I. Gubkin (8 pages) in *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Apr. 1951, p. 627-634.)

See also:

2402 (statistical study of drop forging)
2583 (phosphate metalworking lubricants)
2714 (efficiency of metal deforming processes)
2885 (rolling of stainless steel)
2965 (fabrication of Cu-clad Al)
2978 (rolling of Al sheet for shipbuilding)

5. METALS—SECONDARY WORKING

2470* Tungsten-Carbide Tooling. Part I. Factors in the Operation of Multiple-Edge Tools With Particular Reference to Milling Cutters. Part II. Tip-Forms Associated With the Design of Brazed and Inserted Teeth; Methods of Retaining Inserts. *Aircraft Production*, v. 14, Jan. 1952, p. 30-35; Feb. 1952, p. 68-72.

Surveys advancements made in the above.

2471 How to Double a Tool's Output. *Business Week*, Jan. 19, 1952, p. 74, 76, 78, 80.

Describes new machine-tool-cooling process developed by Gulf Research & Development Co. In this method, called "Hi-Jet," the work piece is no longer inundated with cutting oil; instead a jet about half the thickness of the lead in a pencil is squirted at the machining point. The squirt comes from below the cutting tool instead of from overhead. Advantages claimed are as follows: cutting speeds 3-4 times faster than conventional ones; at existing speeds, tool life extended 3-12 times; eliminates separate roughing and finishing cuts; coolant consumption only 5% of conventional; and facilitates machining of tough metals like Ti and stainless steels.

2472 Gouging and Cutting Torch Uses Electric Arc and Compressed Air. Hubert Chappie. *Foundry*, v. 80, Feb. 1952, p. 189-190.

Describes Arcair process which is a means of removing metal, through utilization of a torch requiring a ⅜-in. x 12-in carbon electrode, an ordinary 300-400 amp. d.c. welding machine, and a compressed air supply.

2473 Possibilities of the Pre-Stressing of Metallic Constructions. W. Soete. *Transactions of the Institute of Welding*, v. 14, Oct. 1951, p. 161-167; disc., p. 167-168.

Discusses the above giving methods. Describes what happens in systems in equilibrium under external forces and in systems in internal equilibrium. Data are graphed.

2474 Radioactive Tracers for Rapid Measurement of Cutting Tool Life. M. Eugene Merchant and E. J. Krabacher. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1507-1508.

The method consists, in essence, of machining with a cutting tool which has been rendered radioactive by neutron irradiation in a nuclear reactor and measuring the radioactivity of the collected particles worn from the tool during a few seconds of cutting.

2475* An Experiment in Superfinishing. (In Japanese.) Renzo Kaneko and Kunio Yamada. *Journal of Mechanical Laboratory*, v. 5, Aug. 1951, p. 165-168.

Describes investigation of superfinishing of cast iron. Apparatus is diagrammed. Surface structures are illustrated. Data are tabulated.

2476 Shot Peening Deserves Consideration During Initial Design. *SAE Journal*, v. 60, Jan. 1952, p. 41, 46. (Based on "Ordnance Applications of Shot Peening" by Earl H. Abbe; "Shot Peening of Heavy-Duty Transmission Gearing" by Thomas Backus; and "Shot Peening in the Design of Machine Parts" by John C. Straub.)

Tells how designing new machine parts from the start to be shot peened may result in better products in many cases and reduce production expense in other cases. Where ordinary cast iron is impractical, the possibility of using nodular iron and shot peening it is reviewed.

2477* Is Mechanical Stress Relief Necessary for the Safety of Welded Pressure Vessels? (In French.) H. Gerbeaux. *Soudure et Techniques connexes*, v. 5, Nov.-Dec. 1951, p. 251-256.

The above was investigated with respect to plastic deformation of the material under severe states of stress, stabilization of successive service cycles, and influence of residual stresses. Concludes that such treatment is usually unnecessary. Schematic diagrams.

2478* Plastic Deformation During the Cutting of Steel. (In Russian.) V. V. Kuziushin. *Stanki i Instrument*, v. 22, Apr. 1951, p. 19-21.

From theoretical considerations and experimental data, a co-

5. *Metals—Secondary Working*

efficient of deformation was developed which is used in computing the deformation of metal during cutting. Results are discussed and charted.

2479 New Metal Cutting Concept Lengthens Tool Life. *Steel*, v. 130, Jan. 21, 1952, p. 76.

Outlines process developed by K. R. Blake, Metalloid Corp., Huntington, Ind., which uses a chemical compound known as Metalloid X-20, which acts to limit the movement of the atoms in the crystal lattice of the metal when it is being cut. Tool life has been increased up to 900% and speeds and feeds 25-35%.

2480 Hot Forming Practice at Northrop Aircraft. Part. I. Gilbert C. Close. *Steel Processing*, v. 38, Jan. 1952, p. 23-24.

Discusses the forming process, giving heating methods and mechanical properties of Mg-alloy and Al-alloy sheet and extrusions. (To be continued.)

2481* Integrally Stiffened Wing Panels Formed by Shot Peening Method. Ted C. Simmons. *Western Metals*, v. 10, Jan. 1952, p. 25-27.

Describes and illustrates equipment and procedures for the above. 75S-T6 Al plate is the material used.

See also:
2466 (weaving wire rope)
2714 (efficiency of metal deforming processes)
2968 (steels for broaching)
2973 (Al-container manufacture)

6. POWDER METALLURGY

2482* Magnetic Parts by Powder Metallurgy. W. J. Polydoroff. *Electrical Manufacturing*, v. 49, Jan. 1952, p. 97-99, 228-230, 232, 234, 236, 238, 240, 242.

Discusses properties of sintered compacts for d.c. applications, and the beneficial effect of alloy additions tending to produce increased density. Iron powder was the principal material involved. Quasilaminated material offers promise for a.c. service.

2482a Crystal Size Distribution of Electrolytic Metal Powders; Powders from Fused Electrolyte Baths. Chuk-Ching Ma. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 342-346.

A study was made of the effect of bath temperature and current density upon the size and size distribution of metal crystals produced electrolytically from fused salt baths. Results of experiments on Cb, Ta, and W powders are presented. Two generalized rules were established: The higher the bath temperature, the coarser will be the metal crystals. The higher the current density, the finer will be the metal crystals.

2483 The Production and Properties of Oxide-Reduced Copper Powder. C. Ellwood and W. A. Weddle. *Journal of the Institute of Metals*, v. 80, Jan. 1952, p. 193-206.

Presents a study of some of the principal variables in the oxidation of Cu wire, the comminution of the oxide so produced and its subsequent reduction to metallic copper powder. The properties of the powder and the effect on the final sintered product of variables in the production of the oxide and in subsequent pressing and sintering were also investigated. 13 ref.

2484 Unrelated Simultaneous Interdiffusion and Sintering in Copper-Nickel Compacts. J. M. Butler and T. P. Hoar. *Journal of the Institute of Metals*, v. 80, Jan. 1952, p. 207-212.

In the above investigation, the progress of interdiffusion in Cu-Ni compacts was followed by metallographic examination of these compacts stained with the vapor from aqueous ammonium polysulfide. Results of the experiments show that although metallic interdiffusion and sintering can and do occur simultaneously, the two phenomena are not causally related, and also that interdiffusion can, in the early stages of heat-treatment, produce porosity and cause expansions that are the reverse of sintering. Micrographs. 24 ref.

2485 Hot Pressing Silver Powder. K. Ogawa and G. Matsumura. *Journal of Metals*, v. 4, Jan. 1952, p. 28-29.

Presents a study of the change of the aggregated state of Ag powders at various temperatures, and temperature range in which the effect of hot pressing is most marked. The compressibility of powder under low pressures at different temperatures was measured, and from these experiments, 3 degrees of change of the aggregated state at each temperature were observed. Results are graphed and tabulated. 10 ref.

2486* Iron Powder: A Non-Allocated Metal. Philip R. Kalischer. *Precision Metal Molding*, v. 10, Jan. 1952, p. 23-25, 54-55.

Surveys availability of the above and its probable military uses. Parts that can be made from iron powder are discussed.

2487* Bronze Cams and Iron Followers in Matched Sets by Powder Metallurgy. *Precision Metal Molding*, v. 10, Jan. 1952, p. 35, 37-40.

Describes and diagrams methods used in production of the above for brake-control valves. The cams are made of sintered bronze and the follower of sintered iron. Dissimilar metals were chosen for wear and bearing properties.

2488* Investigation of Sintered Aluminum. (In German.) Edith Boenisch and Wilhelm Wiederholt. *Zeitschrift für Metallkunde*, v. 42, Nov. 1951, p. 344-348.

Describes "SAP," a new sintered Al material, produced in a research laboratory in Germany. It contains 88.8% metallic Al, 10.5% Al_2O_3, and small percentages of Si, Fe, Ti, and Cu. Its chemical, physical, mechanical, and structural characteristics, and its corrosion resistance, are indicated. Tables, charts, and micrographs.

Miscellaneous Publications

2489 Contribution to Magnetic Properties and Usefulness of Permanent Magnets Made From Powders. H. Fahlenbrach. Henry Brutcher, Translation 2757, 7 pages. (From *Archiv für das Eisenhüttenwesen*, v. 20, Sept.-Oct. 1949, p. 301-304.)

Previously abstracted from original.

Books

2490 Explosive Characteristics of Titanium, Zirconium, Thorium, Uranium and Their Hydrides. Irving Hartmann, John Nagy, and Murray Jacobson. U. S. Bureau of Mines, Report of Investigations 4835, 16 pages, Dec. 1951. (TN21 Un3r)

Summarizes the results of experiments on 22 samples of Ti, Zr, Th, U powders and their hydrides. Data are graphed and tabulated. 16 ref.

See also:
2489 (magnetic proeprties of powdered-metal magnets)
2980 (zirconium-powder production)
3085 (preparation of TiC-base cements)

7. METALS—WELDING OR JOINING

2491* Aluminum for Underground Network Cables. C. P. Xenis. *Electric Light and Power*, v. 30, Feb. 1952, p. 106-109.

Describes difficulties, and methods of solving problems encountered in splicing Al underground cables. Gives step-by-step method of constructing soldered joints. Discusses brazed and riveted connections. Gives information on tensile tests.

2492 Hermetic Welding Stops Internal Corrosion. Bernard Gross. *Iron Age*, v. 169, Feb. 7, 1952, p. 142-144.

Discusses the above process for tubular aircraft structures such as engine mounts. Corrosion prevention is due to the fact that internal surfaces are hermetically sealed against the atmosphere. Methods of testing the welds for complete sealing are described.

2493 Rubber-Metal Parts. H. H. Hile, E. E. Blaurock, and A. S. Miceli. *Machine Design*, v. 24, Jan. 1952, p. 142-147.

Gives information on bonding rubber to steel. Discusses bond stresses, type of metals, tolerances, molds, the curing process, and size shrinkage. Diagrammed.

2494* Welding Turbine Shafts and Wheels for Jet Engines. George H. DeGroat. *Machinery* (American), v. 58, Jan. 1952, p. 179-183.

Methods employed at Wright Aeronautical Corp. to meet high-quality specifications are described and illustrated. The wheels are made of 16-25-6 Cr-Ni-Mo steels and the shafts of low-alloy steel (0.70% Mn, 1.65-2.0% Ni).

2495 Carbon Steels Successfully Welded by Inert-Gas-Shielded Metal Arc Process. H. T. Herbst and T. McElrath, Jr. *Materials & Methods*, v. 35, Feb. 1952, p. 86-87.

Describes use of a new argon-oxygen mixture. This mixture, containing approximately 5% O_2 and 95% A (marketed as Linde argon-sigma grade), permits welding at high speeds without undercutting, improves coalescence of the weld metal at increased welding speeds, and provides good stability and low spatter rate.

2496* Investigation of Argon-Arc and Autogenous-Welded Light-Metal Sheets. (In German.) K. Longard. *Metall*, v. 5, Dec. 1951, p. 538-539.

Results of hardness, tensile, and bending test investigation of the above are tabulated and charted. Photomicrographs show comparative weld microstructures. 99.5% Al and 4 Al alloys were tested.

2497* Free Flowing Temperature of Silver Solder. (In German.) O. Loebich. *Metall*, v. 5, Dec. 1951, p. 548-550.

Describes method for determining the above. Importance of finding the free-flowing temperature for the work piece in order to assure quality soldering is indicated; results are discussed.

2498 Flux Bath Dip Brazing of Aluminum Alloys. D. Wallace, *Product Engineering*, v. 23, Feb. 1952, p. 173-175.

Discusses various Al alloys giving properties and suitability for brazing. Gives details of brazing process, stressing melting temperatures and mechanical properties of the filler and base metal.

2499 A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Seferian. *Sheet Metal Industries*, v. 29, Jan. 1952, p. 53-61.

Discusses weldability of cast irons; oxyacetylene welding of gray cast iron; arc welding of cast iron; and weld-brazing of steels and cast irons. Graphs and micrographs. (To be continued.)

2500* Spot-Welding of Semi-Hard Low Alloy Steel; Critical Study Concerning the Influence of Different Welding Parameters on the Quality of the Spots. (In French.) P. Joumat. *Soudure et Techniques connexes*, v. 5, Sept.-Oct. 1951, p. 224-232; Nov.-Dec. 1951, p. 267-276.

Influence of intensity and duration of different parameters on Macrostructure and microstructure, as well as on certain mechanical properties of spot welds in steel plate were investigated. In Part 2, effects of regulation of tempering, preheating, and pressure were investigated. Results are shown graphically. Includes micrographs and macrographs.

2501* A Solution to the Problem of Semi-Automatic Welding Under Flux. (In French.) J. Petit. *Soudure et Techniques connexes*, v. 5, Nov.-Dec. 1951, p. 241-246; disc., p. 246-247.

Describes and illustrates a semi-automatic apparatus for the above which makes it possible to have either continuous or discontinuous feeding of powder. Includes photographs.

2502 How to Get More Out of Resistance Welding Control. *Steel*, v. 130, Jan. 28, 1952, p. 68-69, 81.

Discusses advantages of the ignitron for extending welding equipment to handle heavier loads. Data are charted; circuits are diagrammed.

2503 A Comparison of Heating Methods for Brazing. Part II. Lester F. Spencer. *Steel Processing*, v. 38, Jan. 1952, p. 29-34.

Discusses and evaluates various methods available in brazing of ferrous and nonferrous assemblies. Includes induction heating, torch, furnace, salt-bath, radiant gas, and resistance brazing.

2504* Welding Jets at Solar Aircraft. Clyde B. Clason. *Welding Engineer*, v. 37, Feb. 1952, p. 17-21.

Describes the above at Solar Aircraft Co., Des Moines. Most jet-engine parts are fabricated from 347 (Co-stabilized) stainless steel, Inconel and Inconel X.

2505* Welding the High-Heat-Resistant Materials. J. L. Solomon. *Welding Engineer*, v. 37, Feb. 1952, p. 38-42.

Discusses the problems involved in welding alloys capable of withstanding service temperatures around 1800-1900°F.

2506 Welding Iron-Bearing Alpha Aluminum Bronze. F. Emery Garriott. *Welding Journal*, v. 31, Jan. 1952, p. 18-28.

Tests on the above show that Fe-bearing alpha Al-bronze sheet and plate can satisfactorily be fabricated by the various arc-welding processes. Mechanical properties of the weld metal produced by any of these processes are comparable to those of the base metal.

2507 Product Design for Welding. John Mikulak. *Welding Journal*, v. 31, Jan. 1952, p. 29-34.

Describes in detail equipment and method for economical automatic welding of moderate quantities on production jobs. Graphs, diagrams, and illustrations.

2508 Welding of High-Alloy Castings. R. David Thomas. *Welding Journal*, v. 31, Jan. 1952, p. 27s-32s.

A restrained test plate was devised for evaluation of the quality of welds in 15-35 Cr-Ni castings from the standpoint of freedom from cracks, fine fissures, and other forms of defects. Radiographic examination of the plates will only reveal major defects, but existence of fine fissures can be determined by cross-sectioning the welds, polishing, and macroetching.

2509 Welded Continuous Frames: Plastic Design and the Deformation of Structures. P. S. Symonds. *Welding Journal*, v. 31, Jan. 1952, p. 33s-36s.

Presents a discussion on the above paper published in July 1951 issue.

2510 Stainless-Steel Weld Deposits on Mild and Alloy Steels. Helmut Thielsch. *Welding Journal*, v. 31, Jan. 1952, p. 37s-64s.

Presents a review of published and unpublished information on dissimilar-metal joints made with stainless-steel electrodes: metallurgical characteristics of joints, dilution, mechanical properties, heat treatments, carbon migration, base-steel and weld-metal cracking, hardenable steels, and applications. 114 ref.

2511 Reclamation of Iron Castings by Reinforced Bronze Welding. G. G. Musted. *Welding and Metal Fabrication*, v. 20, Jan. 1952, p. 25-26.

Shows how excellent results can be obtained in the repair and reclamation of defective iron castings intended to be subject to high pressures, using oxyacetylene bronze welding on electric arc sealing runs, the castings being reinforced by steel studs and lengths of mild-steel round bar.

2512 Welding of Large Aluminum Structures. Recent Researches on the Arc Welding of Thick Aluminum Alloy Plate. P. T. Houldcroft, W. G. Hull, and H. G. Taylor. **Practical Aspects of the Argonarc Welding of Aluminum Alloy.** J. R. Handforth. *Welding and Metal Fabrication*, v. 20, Jan. 1952, p. 27-34; disc., p. 35. (Condensations.)

Includes tables and diagrams.

Books

2513 Electronic Motor and Welder Controls. George M. Chute. 347 pages. 1951. McGraw Hill. (TK7882.c6 C47e)

Describes improved electrical circuits for the above. Includes a variety of closed-cycle, motor-control systems. The stable operation of such motors is considered.

2514 Werkstoff und Schweissung. Handbuch für die Werkstoff-und Werkstoffbedingte Verfahrenstechnik der Schweissung. (Materials and Welding. Handbook on Materials and Techniques of Welding.) Vol. I. Friedrich Erdmann-Jesnitzer. 1003 pages. 1951. Akademie-Verlag, 19 Schiffbauerdamm, Berlin, N.W.7, Germany. (TS227 ER28W)

Comprehensive treatise covers the field of ferrous metals, including production, rolling, weldability and other properties of sheet steels, principles and special welding methods, and design of welded structures. Includes tables, graphs, diagrams, photographs, photomicrographs, and numerous references.

See also:

2433 (welding of Cu-Ni castings)
2468 (joining of fine-wire resistors)
2477 (stress relief of welded pressure vessels)
2560 (weldability of chromated Al)
2635 (weld-deposition repair of alloy-steel welds)
2698 (steel-plate welds—explosion testing)

7. *Metals—Welding or Joining*

2699 (joining of ferritic and austenitic steels)
2726 (fatigue strength of panels with welded stiffeners)
2729 (spot-welded Al alloys)
2766 (welded gas mains—stress corrosion cracking)
2965 (welding of Cu-clad Al)
2978 (welding of Al sheet for shipbuilding)
3087 (bonding of boron carbide to metals)
3113 (welding of aircraft materials—discussion)
3503 (rubber adhesives in metal bonding)
3696 (fusing Zn-Sb to constantan)

8. METALS—THERMAL TREATMENT

2515 Gaseous Annealing of Malleable Castings; Operations at William Lee & Sons, Dronfield. J. C. Mantell. *Foundry Trade Journal*, v. 91, Dec. 27, 1951, p. 741-744.

A year ago a standard Birlec 300 k. w. elevator type electric malleabilizing furnace was installed at above British plant, for annealing whiteheart malleable castings. Since that time, comprehensive and accurate records have been kept of the 90-odd heats annealed, and monthly digests of data have been derived from these day-to-day observations.

2516 Ford Automotive Parts Hardened by Dry Cyaniding. *Industrial Heating*, v. 19, Jan. 1952, p. 26-28, 30, 32-34, 186.

Describes furnace fired by 12 gas-fired radiant tubes for hardening automobile parts. Gives composition and hardness of carbon steel parts before and after heat treatment. Diagram gives layout, showing arrangement of heating zones and quenching mechanism. Illustrated.

2517 Quench-Temper Treatment Improves Nodular Irons. J. E. Rehder. *Iron Age*, v. 169. Jan. 17, 1952, p. 89-93.

Presents results of an investigation to determine the effect of Si, Ni, Cu, P, Mo, and Mn on the mechanical properties of nodular irons. Gives results of quench-temper treatment on a large number of heats at various temperatures.

2518 Fast Quench Oil Improves Hardenability in Aircraft Steels. James McElgin. *Iron Age*, v. 169, Jan. 24, 1952, p. 72-74.

Discusses new high-speed quenching oil which makes possible maximum hardness penetration in thicker sections of aircraft low-alloy steels. Performance characteristics are compared. Data are graphed and tabulated.

2519 Are You Getting the Most From Your Water Sprays? W. P. Wallace and C. E. Manes, Jr. *Iron Age*, v. 169. Jan. 31, 1952, p. 112-114.

Results of an investigation on the above are given. Speed of quenching with water sprays depends on droplet size and the breakdown of the insulating steam layer around the steel. Variables studied indicate water sprays can be used to greater advantage to promote deeper hardening.

2520 Heat-Treatment of Titanium-Rich Titanium-Iron Alloys. H. W. Worner. *Journal of the Institute of Metals*, v. 80, Jan. 1952, p. 213-216.

An investigation on the above shows that alloys with 2-6% Fe can be hardened appreciably by water-quenching them from the β-Ti-Fe solid-solution region. Some of the alloys which could be retained as β solid-solutions by water-quenching exhibited age-hardening effects when heated for a few hours in the range 220-450° C.

2521* Flame-Hardening—A Flexible Method of Surface Treatment. H. V. Inskeep. *Machinery* (American), v. 58, Jan. 1952, p. 166-171.

Describes and illustrates the above as applied to various types of parts. Data for cast irons, carbon, and alloy steels are tabulated.

2522* Electrode Salt Baths. *Machinery Lloyd* (Overseas Edition), v. 23, Dec. 1951, p. 87-89, 91, 93.

Discusses use of above for obtaining heat-treatment temperatures between 550-1350°C. In addition, a layer of salt adheres to components being removed from the bath, thus preventing contact with the air and preventing scaling.

2523* Heat Treatment and Pickling of the Stainless Steels. (Continued.) Lester F. Spencer. *Magazine of Tooling and Production*, v. 17, Jan. 1952, p. 54, 56, 128, 130, 132, 150, 158, 164-167, 174.

Discusses the hardening procedure. Presents charts showing the effect of Cr and C on the "as-quenched" hardness of 3 stainless-steel compositions; Types 410, 403, and 416. Tables on temperature ranges for various types of stainless steels are given. Choice of furnace equipment is discussed. Presents a number of methods of scale removal. 12 ref.

2524 The Surface Hardening of Steel. Part XII. Induction Heating. (Concluded.) G. T. Colegate. *Metal Treatment and Drop Forging*, v. 19, Jan. 1952, p. 35-42.

Describes the high-frequency induction-heating technique for surface hardening. A description of the principles involved is given, and controlling factors for depth of hardening enumerated. A comparison is made with other surface-hardening treatments already discussed in this series. 78 ref.

2525 Testing Round Carbon Drill Steel. Paul L. Russell. *Mining Engineering*, v. 4, Jan. 1952, p. 42-43.

Progress report of an experiment involving heat treatment of the shank ends of drill steel. Drilling tests were made in two types of work. The purpose was to determine the effect of an increase in soaking time during the hardening process.

2526 On the Abnormality in the Thermal Expansion of Iron-Platinum Alloys. (In English.) Hakaru Masumoto and Takeo Kobayashi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 2, Dec. 1950, p. 856-860.

Measurements of the above were carried out, and it was found that the alloys containing 52.5-53.5% Pt have, near room temperature, negative coefficients of expansion.

2527* Recent Work and Opinions on the Age Hardening of Aluminum Alloys. (In German.) F. Rohner. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 17, Nov. 1951, p. 332-336.

Critical review of literature reveals that earlier views on this phenomenon are being challenged. 23 ref.

2528* Investigation of Annealing Resulting From the Heat Involved in Hot Working, and Accompanying Isothermal Trasformations. (In German.) Erich Theis. *Stahl und Eisen*, v. 71, Dec. 1951, p. 1433-1438; disc., p. 1438-1440.

Presents results of investigation of the above for a roller-bearing steel containing 1% C and 1.5% Cr; structural steel containing 0.55% C, 1.0% Cr, and 0.10% V; "silver" steel containing 1.2% C and 1.0% W; high-speed steel containing 0.95% C, 4.0% Cr, 3.0% Co, 2.3% V, and 10% W; stainless steels containing (1) 0.4% C and 13% Cr, (2) 0.25% C, 18% Cr, and 1.5% Ni; and toolsteel containing 0.5% C, 0.15% Mo, and 3% Ni. Describes advantages and applications of the process in which annealing intentionally results from the heat of hot working.

2529 Production Heat Treating. George Goepfert. *Steel*, v. 130, Feb. 11, 1952, p. 82-84, 112, 114.

Describes heat-treating procedures on steering-assembly parts generally made from SAE-8620 steel .

2530 Predetermination of Preheat and Postheat for Submerged-Arc Welding. Clarence E. Jackson and Arthur E. Shrubsall. *Welding Journal*, v. 31, Jan. 1952, p. 1s-10s.

Presents a comparison of the transformation of austenite with continuous cooling; and discusses applications of controlled preheat and postheat treatments in welding alloy steels. Data are graphed.

2531* Application of Hydrocyanic Acid in Case Hardening. (In German.) Alb Stähler. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93, Dec. 11, 1951, p. 1093-1097.

Presents results of experiments on the above applied to various carbon and low-alloy steels. Results are charted, tabulated, and illustrated by photomicrographs. Vickers hardness and wear resistance were determined .

Miscellaneous Publications

2532 Metallographic Detection of Temper Brittleness in Heat-Treating Steels. H. Klemm. Henry Brutcher, Translation 2817, 4 pages. (From *Stahl und Eisen*, v. 71, no. 23, 1951, p. 1264-1265.)

Presents a study of the possibility of using alkaline $KMnO_4$ as

etchant for detection of temper brittleness in steel. Examples demonstrating usefulness of the proposed metallographic technique are given.

See also:
2433 (heat treatment of Cu-Ni castings)
2462 (heat treatment of small drop forgings)
2510 (heat treatment of steel welds)
2596 (heat treatment of Cu-Al-Fe-Ni bronze)
2608 (heat treatment of Fe-bearing cupronickels)
2652 (hardening of steels—effects of B and V)
2665 (annealing vs. thermoelectric power of Mo)
2701 (prediction of heat-treatment properties of assemblies)
2719 (heat treatment vs. properties of Ni-Mn alloys)
2727 (heat treatment of boron steels)
2728 (fibrous fracture in heat-treatable steel)
2885 (annealing of stainless steel)
2962 (selection of heat-treatable steels)
2963 (heat treating of steels for low-temperature service)
2965 (annealing of Cu-clad Al)
2971 (heat treatment of drill rod)

9. CLEANING, FINISHING, AND COATINGS—METALLIC

2533 Relative Importance of Various Sources of Defect-Producing Hydrogen Introduced Into Steel During the Application of Porcelain Enamels. Dwight G. Moore, Mary A. Mason, and William N. Harrison. *Journal of the American Ceramic Society*, v. 35, Feb. 1, 1952, p. 33-41.

Deuterium was used to trace the source of defect-producing hydrogen in steel. The deuterium was introduced, in turn, as a replacement for protium in the pickling acid, the milling water, the quenching water, the chemically combined water in the clay, and the dissolved water in the frit. The bases evolved during fishscaling of the coated steel specimens from each experiment were collected and analyzed for deuterium and protium with the mass spectrometer. Other experiments demonstrated that reboil in ground-coat enamels is closely associated with water content of the coating. 20 ref.

2534* The Cleaning of Metals in Engineering Processes. I. B. McKenzie. *Australasian Engineer*, Dec. 7, 1951, p. 87-93.

Describes various mechanical and chemical methods for cleaning metals. Stresses ferrous materials. Tabulated classification of cleaning methods is given. 33 ref.

2535 Fast Economical Descaling by Use of Induction Heat. Homer Kincaid. *Automotive Industries*, v. 106, Jan. 15, 1952, p. 43, 98.

Describes and gives results of above process for removal of surface scale from metal parts after heat treatment. Theory is discussed.

2536 Use Inhibitors to Help Conserve Pickle Acids. Paul A. Huppert. *Ceramic Industry*, v. 58, Feb. 1952, p. 61-62.

Describes how inhibitors work and discusses their advantages for enamelers, a few of which are metal conservation, smoother metal surfaces at less cost, and elimination of over-pickling.

2537 The Chemical Resistance of Phenolic and Furfuryl Alcohol Type Coatings. Raymond B. Seymour and Robert H. Steiner. *Corrosion* (Technical Section), v. 8, Feb. 1952, p. 65-68; disc., p. 68.

Spot tests on steel and tinplate panels, quantitative resistance tests on unsupported films, and long-term tests on immersed, coated plummets were run in order to determine the corrosion and solvent resistance of acid-catalyzed phenolic coatings and acid-catalyzed, polyfurfuryl alcohol coatings. Data are tabulated.

2538* Improving the Corrosion Resistance of Metal Surfaces. Allen L. Alexander. *Electrical Manufacturing*, v. 49, Feb. 1952, p. 112-115, 258, 260, 262, 264, 266, 268.

Discusses techniques of preconditioning metal surfaces prior to application of organic finishes.

2539* The Influence of Spraying Conditions on the Grain Size of Sprayed Metal Deposits. P. Koch. *Engineers' Digest*, v. 12, Dec. 1951, p. 406-407, 416. (Translated and condensed from *Metalloberfläche*, sec. A, v. 5, Sept. 1951, p. A129-A133.)

Previously abstracted from original.

2540* Metal Spraying. A. R. Old. *Journal of the Oil and Colour Chemists' Association*, v. 35, Jan. 1952, p. 20-24; disc., p. 24-27.

The metal-spraying process is described and an indication of its scope and applications is given. Certain practical points are mentioned with special reference to the paint industry. Its value in corrosion protection, reclamation of worn parts, and decoration is outlined.

2541 Stress Reduction of Electrodeposited Nickel. Vincent J. Marchese. *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 39-43.

Tests were conducted to investigate possibilities of electroforming low-stress Ni microwave plumbing. Two methods were studied: use of saccharin as an addition agent in a standard Watts bath, and superimposition of a.c. on d.c. Results are discussed, tabulated, and diagrammed. 12 ref.

2542 Electrodeposition of Rhenium-Cobalt and Rhenium-Iron Alloys. L. E. Netherton and M. L. Holt. *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 44-47.

Describes the above, undertaken to determine suitable conditions for using an ammoniacal citrate plating bath. The effects of bath composition, pH temperature, and current density on cathode current efficiency and composition of the alloy deposit were studied.

2543 The Electrodeposition of Cobalt-Tungsten-Molybdenum Alloys From Aqueous Citrate Solutions. R. F. McElwee and M. L. Holt. *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 48-52.

Gives experimental procedure and results of the above investigation.

2544 Electroforming Aluminum Waveguides Using Organo-Aluminum Plating Baths. W. H. Safranek, W. C. Stickner, and C. L. Faust. *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 53-59.

Al waveguides with twists, bends, and/or tapers were electroformed by electrodepositing Al on electropolished, Cu-plated, Cd-Ni-alloy materials, followed by melting out the Cd-Ni alloy and dissolving out the Cu in HNO_3 solution. This is a new procedure for obtaining mirror-like inner surfaces on electroformed articles. 80 ref.

2545 The Effect of Indium Sulfate in Chromium Plating Baths. Norman Hackerman and Tyleen Jensen. *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 60-63.

Addition of indium sulfate to the regular 100-1 Cr plating bath permitted formation of a bright electrodeposit at 32°C. at current densities considerably above the accepted bright-plating range. The deposit was more nearly crack-free than that usually formed and it was a better protective coating according to a salt-drop test. It was more adherent both to steel and to Cu than deposits formed from the regular bath in the bright range. Photomicrographs.

2546 Cathode Polarization Potential During Electrodeposition of Copper. II. Variation of the Cathode Polarization Potentials With Current Density and Electrolyte Concentration. L. L. Shreir and J. W. Smith, *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 64-70.

Gives experimental procedure and results of the above. Data are graphed and tabulated.

2547 The Effect of Chloride Ions on Copper Deposition. W. H. Gauvin and C. A. Winkler. *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 71-77.

Presents and discusses results of the above investigation. Data are graphed and tabulated.

2548 Concentration Polarization During Copper Deposition in a Convection-Free System. R. C. Turner and C. A. Winkler. *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 78-83.

Discusses the procedure and results of the above investigation. Includes tables, diagrams, graphs, and illustrations. 14 ref.

2549 The Effects of Halides on Copper Deposition in the Presence of Gelatin. L. Mandelcorn, W. B. McConnell, W.

9. *Cleaning, Finishing, and Coatings—Metallic*

Gauvin, and C. A. Winkler. *Journal of the Electrochemical Society*, v. 99, Feb. 1952, p. 84-88.

Discusses and presents results of the above investigation. Includes graphs. 11 ref.

2550 Metallizing Cuts Marine Maintenance Costs. Fred M. Earle. *Iron Age*, v. 169, Jan. 31, 1952, p. 103-105.

Tells how Al and Zn sprayed on properly cleaned iron and steel and coated with vinyl sealers are effectively protecting steel fishing boats from salt-spray corrosion. Maintenance costs are lower. Entire envelopes of ships are being sprayed during construction to protect steel hull and deck plates.

2551 Control Addition Agent Vital in Lead-Tin Plating. J. B. Mohler. *Iron Age*, v. 169, Feb. 7, 1952, p. 139-141.

Discusses need for the above and states that small amounts of Cu, Sb, or As increase strength and fatigue resistance. Gelatin or glue in the bath give a fine-grained deposit. Resorcinol minimizes change in deposit composition; best determined by a bromination method. 10 ref.

2552* Study on Liquid Honing. I. (In Japanese.) Hidehiko Takeyama. *Journal of Mechanical Laboratory*, v. 5, July 1951, p. 111-114.

Demonstrates possibility of vapor blasting with modified sand-blasting equipment. Need for an improved nozzle is, however, indicated. Experimental results and a fundamental equation for blasting of ductile materials such as mild steel are presented. Diagrams and graphs.

2553* Study of Abrasives. I-IV. (In Japanese.) Wataru Funahashi. *Journal of Mechanical Laboratory*, v. 5, Aug. 1951, p. 176-182; Sept. 1951, p. 192-197.

Part I describes and illustrates microstructure of Japanese-produced abrasives made from quartzite. Part II presents results of use for polishing of Cu electrodeposits. Part III likewise for Ag electrodeposits; and Part IV for Ni, Cu, Al, brass, and "Almite" electrodeposits. Graphs, tables, and micrographs.

2554 Aluminum Electroplated on Steel From Fused Salt Bath. F. R. Collins. *Iron Age*, v. 169, Jan. 17, 1952, p. 100-101.

Al has been successfully electroplated on steel from a fused $AlCl_3$-NaCl salt bath. The plate is uniform and no interfacial layer of Fe-Al alloy occurs. Coated steels show high resistance to rusting in industrial, seacoast, and humid atmospheres. Coating is free of continuous pores. Photomicrographs.

2555* Recent Applications of the Technique of High-Vacuum Vapor Deposition as a Means of Metallizing Plastic Materials. (In German.) L. Hiesinger. *Kunststoffe*, v. 41, Dec. 1951, p. 444-446.

Equipment, procedure, and uses are described and illustrated. Includes tabulated data.

2556* Anticorrosion-Decorative Nitriding. (In Russian.) Ia. A. Shliamberg. *Leghaya Promyshlennost*, v. 11, Apr. 1951, p. 39-41.

The above treatment of various steel articles is described and discussed as a means of conserving nonferrous metals.

2557 Protective Finishes. Part 1. Finishes and Undercoating. Norman P. Gentieu. *Machine Design*, v. 24, Jan. 1952, p. 108-114, 196, 198.

Discusses inorganic films formed on metals for the purposes of coloring, rust or corrosion proofing, wear resistance, protecting rubbing surfaces, or improving joint adhesion. Gives reaction equations; tables give military finish specification; and protective-finish and corrosion-resistance data.

2558 Power Brush Finishing. V. K. Charvat and R. C. Sasena. *Machine Design*, v. 24, Feb. 1952, p. 112-121.

Discusses the application of power-driven brushes to obtain unusual or more refined surface finishes. Includes a table of design factors for brushes and brushing machines.

2559 Silicone Coatings Protect Metals Against Severe Service Conditions. C. E. Arnitzen and R. D. Rowley. *Materials & Methods*, v. 35, Jan. 1952, p. 82-84.

Discusses silicone coatings with respect to heat resistance, weathering, chemical resistance, and applications.

2560 New Protective Treatment for Aluminum Simplifies Processing at Reduced Costs. R. Stricklen. *Materials & Methods*, v. 35, Feb. 1952, p. 91-95.

Discusses the general properties of Iridite no. 14 (Al-Coat) a chromate process for Al developed by Allied Research Products, Inc. Includes data on corrosion resistance, electrical properties, and weldability of the treated Al. Micrographs and tables.

2561* Metal Finishing Developments in 1951. Walter A Raymond. *Metal Finishing*, v. 50, Jan. 1952, p. 50-56.

102 references.

2562* Dragout Control. Part III. Joseph B. Kushner. *Metal Finishing*, v. 50, Jan. 1952, p. 60-64, 74.

Discusses methods for recovery of dragout losses from plating tanks after they have occurred. 11 ref.

2563* Insulation for Plating Racks. J. A. Williams. *Metal Finishing*, v. 50, Jan. 1952, p. 65-70.

Discusses advantages and disadvantages of various types: rubber, wax, and resin. Considers application and maintenance problems. Illustrated.

2564* Calculating Metal Cost for Palladium Plating. *Metal Finishing*, v. 50, Jan. 1952, p. 81.

2565* Surface Treatment and Plating in Naval Aircraft. Gordon S. Mustin. *Metal Finishing*, v. 50, Feb. 1952, p. 53-61, 73.

Discusses above used in preventing corrosion with a view to clarifying the background for specifications most likely to be encountered in naval aircraft work. Materials include high-strength Al alloys and various types of steel. Illustrations. 55 ref.

2566* Evaluating Metal Cleaning Efficiency. Samuel Spring. *Metal Finishing*, v. 50, Feb. 1952, p. 65-68.

Describes use of water spray pattern for evaluation of partially soiled surfaces, especially as a laboratory method, although it is adaptable to plant usage.

2567 Photographic Reproduction on Anodized Aluminium. N. I. Kirillov and A. S. Kheynman. *Metal Industry*, v. 80, Jan. 11, 1952, p. 31-33. (Translated from *Zhurnal Prikladnoi Khimii.)*

Gives details of method by which anodic films can be made light-sensitive.

2568* Zinc Plating in Acid Baths; A Review of the Journal and Patent Literature. (In German.) Richard Springer. *Metalloberfläche*, ser. B, v. 3, Oct. 1951, p. B148-B154; Nov. 1951 ,p. B168-B169.

80 references.

2569* Electroplating of Fine Zinc Alloys. (In German.) K. Löhberg and H. Nann. *Metalloberfläche*, ser. B, v. 3, Nov. 1951, p. B161-B165.

Describes practical procedure for the above, with emphasis on Cu plating, including recommended surface-preparation procedure. Micrographs and photographs.

2570* The Influence of Rectified Current Alternations Upon the Growth of Electrodeposits. (In German.) Max Ed. Beckmann and Friedrich Maass-Graefe. *Metalloberfläche*, ser. A, v. 5, Nov. 1951, p. A161-A169.

Describes Zn, Cu, Ni, and Cr deposits from various electroplating baths. In most cases, no change of the deposit was effected by changing the alternation curve of the rectified current. Data are tabulated; graphs illustrate the results obtained.

2571* Investigation of the Spraying of Zinc Through Ferrous Tubing at Increasing Wall Temperatures. (In German.) Otto Van Rossum. *Metalloberfläche*, ser. A, v. 5, Nov. 1951, p. A172.

Above tubing is used for conduction of acetylene gas used in the spray process. Possibility of causing decomposition of the acetylene at the temperatures encountered (up to 142° C.) is believed to represent a serious hazard.

2572 The Cladding of Metals. R. D. Weber. *Metallurgia*, v. 45, Jan. 1952, p. 3-6.

Following a brief discussion of the principles of metal cladding, an outline is given of methods and processes used, particular

attention being paid to techniques of solid-phase bonding. Reference is also made to liquid-phase cladding, by means of continuous casting, and to scrap recovery of clad metals. 10 ref.

2573 The Protection of Metallic Surfaces by Chromium Diffusion. Part VI. Applications of Chromising. R. L. Samuel and N. A. Lockington. *Metal Treatment and Drop Forging*, v. 19, Jan. 1952, p. 27-32.

Discusses economics of the chromizing process; efficiency of method and equipment; shape and nature of component; and processing sequence. Typical examples are given of application of the process to impart corrosion and heat resistance to various steels. A combined Cr-Si-Al diffusion treatment is described and its potentialities evaluated. (To be continued.)

2574 Current and Metal Distribution in Electrodeposition II. Theoretical Considerations. John Kronsbein. *Plating*, v. 39, Feb. 1952, p. 165-170.

Presents an elementary description of some underlying quantitative principles of the above. Describes some known cases of uniform current and metal distribution and discusses results of theoretical investigations into distribution on flat sheets and on angles.

2575* New Trends in the Chemistry of Barrel Finishing. William E. Brandt. *Products Finishing*, v. 16, Jan. 1952, p. 24, 26, 28, 30.

Surveys the above. Selection of a cleaner depends on the purpose of the operation and the particular metal processed.

2576* Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing*, v. 16, Jan. 1952, p. 46, 48, 50, 52, 54, 56, 58, 60, 62, 66, 68, 72, 74, 76, 78, 80.

Discusses in length some recent contributions on the following topics: eelctrochemical and chemical coatings for aluminum; lacquers for finishing military products; mechanism of paint blistering in sea water; corrosion resistance of anodized titanium; and acid recovery in continuous strip pickling.

2577 Basic Principles of the Pickling and Etching of Steels and Their Application to the Production of Stainless-Steel Sheet. H. E. Zentler-Gordon. *Sheet Metal Industries*, v. 29, Jan. 1952, p. 5-10, 16.

Includes graphs and illustrations of equipment.

2578 Felt for Finishing: Metalworking Applications Expand. Leon D. Gruberg. *Steel*, v. 130, Feb. 4, 1952, p. 88-89, 110.

Discusses the use of felt in metalworking. Refers to cleaning, polishing, and finishing of Cr plated parts, Al, Cu, and stainless steel. Describes process of making, care, and use of felt wheels.

2579 The Mechanical Surface Finishing of Metals G. T. Colegate. *Sheet Metal Industries*, v. 29, Jan. 1952, p. 71-78, 82; Feb. 1952, p. 163-172.

First installment of a series which will consider in detail the various methods used for the above. In the majority of cases, the methods considered will form part of a sequence, the final stage of which is electrodeposition, coloring, or some other form of chemical or electrochemical treatment such as anodizing. Polishing is covered in part 1. Second part covers the effect of various factors on ease of polishing. (To be continued.)

2580 Laboratory Tests Select Best Blast Cleaning Method. Eugene F. Anderson. *Steel*, v. 130, Jan. 21, 1952, p. 62-65.

Describes and illustrates airless blast equipment and procedures designed for various types of parts.

2581 Tin Plating Advances Save Metal. *Steel*, v. 130, Jan. 21, 1952, p. 66-67. (Based on paper by C. T. Kunze and A. R. Wiley.)

Method for measuring tinplate coating, developed at Research Dept., American Can Co., is based on the fact that anodic dissolution of tin coatings on steel proceeds with full current efficiency in HCl enabling the coating weight of a defined area to be calculated by Faraday's law. Sn-Zn and Sn-Ni plating-bath compositions are given.

2582 Clad Steel Bullet Jackets Conserve Copper and Zinc. E. J. Reardon. *Steel*, v. 130, Jan. 21, 1952, p. 68-69.

Describes and diagrams new type welded angle cladding method which produces 2000-3000 lb. 17-in. wide billets and raises yield of usable clad strip. Many thicknesses are possible. 90-10 Cu-Zn or 80-20 Cu-Ni cladding is applied to steel strip used for making the bullet jackets, formerly entirely made from above alloys.

2583 Phosphatizing — Versatile Substitute for Metallic Coatings. *Steel*, v. 130, Jan. 28, 1952, p. 64-66.

Describes advantages and applications of phosphate coatings. Includes use in wire drawing, extrusion, and other working operations.

2584 For Better Finishes Clean Aluminum Thoroughly. *Steel*, v. 130, Feb. 11, 1952, p. 88-90, 92.

Discusses several effective methods for cleaning Al and its alloys. Stresses the importance of good cleaning practice.

2585 Development of Fused Metallized Coatings. Harrison S. Sayre. *Welding Journal*, v. 31, Jan. 1952, p. 35-39.

A review of investigations conducted in the development of materials, techniques, and procedures for the application of fused metallized coatings. Illustrations.

2586* Newly Developed Electrolytic Iron Builds Up Worn Bearing Surfaces. *Western Metals*, v. 10, Jan. 1952, p. 31-32.

Describes "Vanderloy M" process for reclamation of such items as power and compressor cylinders, crankshafts, and the like. Vanderloy M is an iron which is electrodeposited in a fine columnar structure perpendicular to the base metal. Hard Cr is often applied in a thin layer on top of the Fe deposit.

2587 New Electrolytes for Tinning. (In Russian.) V. I. Sotnikova and M. A. Loshkarev. *Zhurnal Prikladnoi Khimii*, v. 24, Apr. 1951, p. 361-372.

The throwing power of H_2SO_4 tin-plating baths with various additions was studied. The porosity of the cathodic deposit for the same conditions was measured. Data are discussed and tabulated. 14 ref.

Miscellaneous Publications

2588 Machine According to Liné-Gorey for Removal of Scale From Steel Wire. P. Ewald. Henry Brutcher, Translation 2782, 4 pages. (From *Draht*, v. 2, no. 6, 1951, p. 175-176.)

Describes mechanical equipment which eliminates all pickling of the stock and the undesirable consequences of pickling operations, such as stream pollution, damage to the sewer system, health hazards, etc.

2589 Electrophosphating. R. Springer. Henry Brutcher, Translation 2783, 11 pages. (From *Metalloberfläche*, v. 1, no. 4, 1947, p. 78-80.)

Reviews U. S., British, German, and French patent literature on use of electric current in connection with the various phosphate-coating processes. Particulars on processes entailing cathodic phosphate coating are given.

2590 Impregnation of Steel With Titanium and Titanium Nitride (In Molten Salts). R. Skorski. Henry Brutcher, Translation 2803, 13 pages. (Condensed from *Hutnik*, v. 17, Sept.-Oct. 1950, p. 290-298.)

Deals with development of a process for producing, on the surface of steel, a protective coating consisting of Ti or titanium nitride. A general study of the effect of titanizing upon mechanical properties and corrosion resistance of steel is reported. 11 ref.

2591 Bearings and the Electrodepositor. O. Wright. *Journal of the Electrodepositors' Technical Society*, v. 25, 1949-50, p. 51-64. (TS670 E25j)

Surveys the requirements of bimetallic bearings. Discusses casting of these bearings and the electrodeposition techniques used. The various compositions are considered. 23 ref.

2592 Stripping of Electrodeposits. R. H. Keller. Defence Research Laboratories, Commonwealth of Australia, Information Circular 16, Sept. 1951, 23 pages. (TN44 A78ic)

Collects in handy form published methods for stripping brass, bronze, Cd, Cr, Cu, Au, Pb, Ni, Pd, Pt, Rh, Ag, Sn, Zn, and speculum from the base metals upon which they are usually plated.

9. *Cleaning, Finishing, and Coatings—Metallic*

2593 The Influence of Surface Behaviour on the Characteristics of Electrodeposits. A. T. Steer. *Journal of the Electrodepositors' Technical Society*, v. 25, 1949-50, p. 125-146. (TS670 E25j)

Discusses fundamental principles of the above, including the problem of examining surfaces and deposits; the mechanism of crystal growth; conditions present in metal surfaces before and after polishing; and influence of surface state on electrodeposition. Results of experiments on electrodeposition of Ni on nickel silver (12.5% Ni) are presented and illustrated by numerous micrographs.

2594 Measurement of Properties of Thin Films on Chromium by the Reflection of Polarized Light. J. B. Bateman and Margaret W. Harris. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 1064-1081. (Q11 N49a)

Presents the results of polarization measurements of aliphatic-acid layers transferred to chromium by the Blodgett method. The data were obtained in order to determine the conditions most favorable to the precise simultaneous measurement of thickness and refractive index. 17 ref.

See also:

2523 (pickling of stainless steels)
2681 (optical properties of surface films)
2758 (corrosion resistance of Cu-Ni-Cr plated Zn, Al, and Mg diecastings)
2810 (radioactive tracer determination of SO_4 in Cr plating baths)
2885 (pickling and polishing of stainless steel)
2971 (surface treatment of drill rod)
2973 (Al container finishing)
2975 (corrosion-preventive coatings for Mg in aircraft)
3571 (electrical properties of thin metallic films)
3651 (vacuum deposition of precious metals on quartz)

10. METALLOGRAPHY AND PRIMARY STRUCTURES

2595* The Relationship Between Lattices of the NiAs and Ni_2In Type and Certain Rhombic Crystals. (In Russian.) I. I. Kripiakevich. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 439-442.

The lattice constants of the above systems were compared. Results are discussed and tabulated. 14 ref.

2596* Metallography of "Xanthal B Type" (Cu-Al-Fe-Ni) Bronze. (In Italian.) A. Gragnani. *Alluminio*, v. 20, Nov. 1951, p. 423-439.

Presents results of comprehensive study of structure, transformations ,and quenching and tempering relationships for above alloy (81% Cu, 11% Al, 4% Fe, 4% Ni). Gives recommended tempering conditions. Numerous graphs, phase diagrams, and photomicrographs. 18 ref.

2597 Nodules and Nuclei in Nodular Iron. J. E. Rehder. *American Foundryman*, v. 21, Feb. 1952, p. 44-48.

Describes work on the metallography and constitution of nodular-iron graphite at the Canadian Department of Mines & Technical Surveys. Numerous photomicrographs of nodules and nuclei illustrate details seen through optical and electron microscopes.

2598 A Technique for Making Strain-Free Replicas for Electron Metallography. William L. Grube and Stanley R. Rouze. *ASTM Bulletin*, Jan. 1952, p. 71-73.

Presents an investigation made to develop a satisfactory procedure which does not subject Formvar to undue stress and which will result in a strain-free replica.

2599* Diffraction of X-Rays at Small Angles by Cold-Worked Metals. (In French.) Jean Blin and André Guinier *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Nov. 19, 1951, p. 1288-1290.

The above was investigated, showing, in a metal submitted to strong cold-working, the presence of submicroscopic cavities, the number of which can be estimated from the X-ray diffraction pattern. Most of the experiments were conducted on high-purity Cu, cast under vacuum, and reduced by cold-rolling to 10-90% of the original dimensions.

2600 The Solid Solutions of Zinc in Aluminium. E. C. Ellwood. *Journal of the Institute of Metals*, v. 80, Jan. 1952, p. 217-224.

The lattice spacings of the solid solutions of Zn in Al were determined at room and elevated temperatures up to the solidus. The phase boundaries of the solid solutions, including the solidus, were determined from the X-ray results and agree well with the published diagram. At room temperature the lattice spacings show that the apparent atomic diameter of Al increases in two separate steps as Zn is added, and it is suggested that these increases are associated with the filling of Brillouin zones. 21 ref.

2601 A Technique for Preparing Beta-Ray Autoradiographs of Metals and Minerals. A. B. Michael, W. Z. Leavitt, M. B. Bever, and H. R. Spedden. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1403-1406.

The above on a microscale is described. Limitations of this technique for microstructural investigations and possible variations are indicated. Illustrative examples of autoradiographs are presented and interpreted. 18 ref.

2602 Atomic Size Effect in the X-Ray Scattering by Alloys. B. E. Warren, and B. L. Averback and B. W. Roberts. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1493-1496.

Shows that if there are appreciable differences in both size and scattering power of two atoms, the size effect can produce modulation in the diffuse intensity which are comparable in size to those produced by short-range order.

2603 Electron Diffraction Study on the Ordered Alloy Au_3Cu. S. Ogawa and D. Watanabe. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1502.

Discusses the above. Results are compared with those of previous investigators.

2604* Electron Microscope and Diffraction Studies of Metallic Smoke. (In Japanese.) Riitsu Takagi. *Journal of Mechanical Laboratory*, v. 5, July 1951, p. 107-110.

Many fringes called "extinction contours" in the electron-microscope images of Al thin sections prepared by an electrolytic method were observed and explained by variation of thickness and distortion of the crystals. Many similar characteristic fringes were observed in electron-microscope images of thin-plate crystals of MoO_3. Illustrated.

2605* Relations Between Structure and Mechanical Properties of the Bicycle Chain's Outer Links. (In Japanese.) Kunio Futaki. *Journal of Mechanical Laboratory*, v. 5, Aug. 1951, p. 135-139.

An attempt was made to determine the relation between ASTM grain size by McQuaid-Ehn test and mechanical properties such as strength and hardness of bicycle chain's outer links after final heat treatment; also the relation between structure after the final heat treatment, quenched and tempered, and load-elongation curve of the chains. It was found that the gradient of the load-elongation curve is influenced by growth of granular cementite. A direct relation between ASTM grain size by the McQuaid-Ehn Test and microstructures of the outer links after heat-treatment, quenching and tempering was not found; but the relation of the ASTM grain size to ferrite and pearlite grain size resulting from normalizing heat treatment was determined.

2606 Constitution of the System Gallium-Indium. John P. Denny, J. Hugh Hamilton, and John R. Lewis. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 39-42.

Presents results of an investigation of the above. The constitution was determined by thermal methods. An experimentally determined metastable equilibrium line (an extension of the In-rich liquidus) was obtained. The various alloys were studied metallographically using polished samples obtained by a casting method. Photomicrographs.

2607 Secondary Recrystallization Texture in Copper. M. Sharp and C. G. Dunn. *Journal of Metal*, v. 4, Jan. 1952; *Trans-*

actions of the American Institute of Mining and Metallurgical Engineers, v. 194, 1952, p. 42-43.

Discusses recently obtained orientations of 137 crystals of Cu produced by secondary recrystallization in a cube texture matrix. Although the crystals were not prepared for the purpose of determining a secondary recrystallization texture, the orientations obtained confirm, in part, published results and disclose additional preferred orientations in the texture.

2608 Constitution and Properties of Some Iron-Bearing Cupro-Nickels. E. W. Palmer and F. H. Wilson. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 55-64.

Deals with the constitution of alloys in the Cu-rich corner of the system, and with variations in hardness and tensile properties resulting from heat treatment of alloys containing various amounts of Fe. Most of this work is concerned with alloys containing 10% Ni. With over 0.75% Fe, the 10%-Ni alloy is susceptible to precipitation hardening. The consequences of this fact in connection with commercial production are examined in some detail. Results are graphed and tabulated.

2609 Crystal Structure of TiAl. Pol Duwez and Jack L. Taylor. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 70-71.

The present knowledge of the Ti-Al system is limited to the portion of the diagram extending from pure Al to the intermetallic compound $TiAl_3$. From an X-ray diffraction study of alloys containing up to 75 ato. % Al ($TiAl_3$), the phase boundaries at 750°C. were located. Crystal structure of a new phase is described.

2610 Crystal Structure of $TaCr_2$ and $CbCr_2$. Pol Duwez and Howard Martens. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 72-74.

Shows that the only intermediate phases in both the Ta-Cr and the Cb-Cr systems correspond to the ideal stoichiometric ratio $TaCr_2$ or $CbCr_2$. Both structures are cubic, $MgCu_2$ type. At high temperature, however, $TaCr_2$ has a hexagonal $MgZn_2$-type structure, which can be retained at room temperature by fast-cooling. Tabulated diffraction data.

2611 A Sensitive Method for Thermal Analysis of Very Low Melting Alloys. R. M. Evans, E. O. Fromm, and R. I. Jaffee. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 74-75.

Describes and diagrams apparatus and method developed for work in the range −72 to 250°C., but adaptable to broader temperature ranges. Typical data for a Ga-rich Ga-Sn-Zn alloy are charted.

2612 Method for Locating Two-Liquid Immiscibility Limits. R. E. Bish. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 81-82.

The above method consists essentially in the measurement of the local electrical resistivity at a sequence of levels in the molten bath. Where a change of phase is encountered, the resistivity changes sharply. This measurement was made by use of a tungsten-wire probe for the Cu-Pb system. Other graphed data and a diagram of the probe are given.

2613 Diffraction Patterns and Crystal Structure of Si_3N_4 and Ge_3N_4. W. C. Leslie, K. G. Carroll, and R. M. Fisher. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 204-206.

A nitride, believed to be Si_3N_4 was separated from 3 nitrided Si steels. Ge_3N_4 was prepared from pure Ge. Comparison of the diffraction patterns indicates that the two nitrides are isomorphous; an orthorhombic structure is suggested in place of the rhombohedral structure previously reported for Ge_3N_4. Micrographs.

2614 Effect of Temperature on the Lattice Parameters of Magnesium Alloys. R. S. Busk. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 207-209.

A series of 8 alloys, consisting of pure Mg, Mg + Ag, Mg + Al and Mg + Sn were studied. Data are graphed and tabulated.

2615 Observations on the Occurrence of Ti_2X Phases. W. Rostoker. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 209-210.

The following alloys were prepared: Ti_2Cu, Ti_4Cu_2O, Ti_2Ni, Ti_4Ni_2O, Ti_2Co, Ti_4Co_2O, Ti_2Mn, and Ti_4Mn_2O. A summary of structures and lattice parameters of the phases found is given.

2616 Crystal Structure of Ti_5Sn. Paul Pietrokowsky. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 211-212.

Describes an investigation on the above. Data are tabulated. 11 ref.

2617 Observations on the Lattice Parameters of the Alpha Solid Solution in the Titanium-Aluminum System. W. Rostoker. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 212-213.

Results on the above investigation are presented graphically.

2618 Cathodic Etcher. *Metal Industry*, v. 80, Jan. 18, 1952, p. 53.

Describes new metallographic technique for studying grain structure. The sample is subjected to glow discharge under vacuum.

2619* Contribution to the Study of the Morphology of Non-Metallic Inclusions in Iron and Steel Products—Inclusions in Ferro-Tungsten. (In Italian.) R. Zoja and M. T. Gottardi. *Metallurgia Italiana*, v. 43, Dec. 1951, p. 526-529.

89 specimens taken from 29 different stocks were examined and a list of the most characteristic inclusions is given for above ferroalloy. Inclusions differ from those in ferro-chromium. Photomicrographs and tables.

2620 Grain Size of Rolled and Annealed Alluminum Alloys; Effect of Rate of Heating. J. Herenguel and F. Santini. *Metal Treatment and Drop Forging*, v. 19, Jan. 1952, p. 15-19, 26.

The influence of the rate of heating, exemplified by salt-bath and air-furnace treatment of 99.5% Al and Al alloys of the D. T. D. 346 or HS-10 type is discussed. Resulting mechanical properties are also presented. Micrographs.

2621* The Palladium-Cadmium System. (In German.) H. Nowotny, A. Stempfl, and H. Bittner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, Dec. 15, 1951, p. 949-958.

Describes study of phase equilibria of above with the aid of microscopic, X-ray, and magnetic methods. Tables, graphs, photomicrographs, and references are presented.

2622* The Palladium-Zinc System. (In German.) H. Nowotny, E. Bauer, and A. Stempfl. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, Dec. 15, 1951, p. 1086-1093.

Describes X-ray, microscopic, thermoanalytical, and magnetic study of above. Graphs, tables, photomicrographs, and references.

2623 Sigma Phase in Vanadium-Nickel Alloys. W. B. Pearson and J. W. Christian. *Nature*, v. 169, Jan. 12, 1952, p. 70-71.

An X-ray examination was made of a V-Ni sigma-phase single crystal containing 60 at. % V. Results are in agreement with those of previous workers for the Fe-Cr and the Co-Cr sigma-phase. V-Ni alloys have the advantage, however, that when Cr radiation is used, there is an appreciable difference in the X-ray scattering power of the V and Ni atoms.

2624* Note on Magnesium Telluride. (In German.) W. Klemm and K. Wahl. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Nov. 1951, p. 289-292.

Describes preparation and structure of above. Tabular data and apparatus diagram are presented. 10 ref.

10. *Metallography and Primary Structures*

2625* Crystal Structure of GeTe. (In German.) Konrad Schubert and Horst Fricke. *Zeitschrift für Naturforschung*, v. 6a, Dec. 1951, p. 781-782.

Describes briefly the lattice constants of the GeTe intermediate phase in GeTe alloys. 11 ref.

2626* The Luminous Screen as Aid in X-Ray Investigation of Fine Structures. (In German.) Johann Christian Lankes, Erika Orlamünder, and Gunter Wassermann. *Zeitschrift für Metallkunde*, v. 42, Oct. 1951, p. 300-301.

Describes use of the above for direct observation of metal-crystal interferences in rotating and Laue pictures.

2627* Crystal Structure of $NiMg_2$, $CuMg_2$, and $AuMg_2$. (In German.) Konrad Schubert and Kurt Anderko. *Zeitschrift für Metallkunde*, v. 42, Nov. 1951, p. 321-325.

Crystal structure of above phases was investigated. Data are tabulated. Unit-cell arrangements are shown diagrammatically. 16 ref.

2628* The Structure of Manganese-Copper-Nickel Alloys With High Manganese Content. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde*, v. 42, Nov. 1951, p. 331-335.

Describes, tabulates, and diagrams various methods for investigating the above ternary system with low Cu content. Structures and phase limits of the system are indicated. Measurements of ductility and hardness are discussed. 10 ref.

2629* The Ternary System Copper-Nickel-Magnesium. (In German.) Werner Köster. *Zeitschrift für Metallkunde*, v. 42, Nov. 1951, p. 326-327.

Describes and diagrams above system as determined by thermal analysis and structural observations.

Miscellaneous Publications

2630 The Crystal Structures of Some Thorium and Uranium Compounds. Norman Charles Baenziger. U. S. Atomic Energy Commission, AECD-3237, Oct. 15, 1948, 114 pages. (UF767 Un3m)

Isostructural compounds with the composition U_6M and Th_7M_3 (where M-Fe, Co, or Ni) were found and their structures determined. Single crystals, examined by the rotation, oscillation, Laue and Weissenberg methods, exhibited diffraction symmetry. A new method for determination of X-ray intensities is described. Data are tabulated. 61 ref.

See also:

2631 (crystal structure and dimensions of Mo_3Ge)
2696 (microstructures of brass castings)
2720 (fibrous structures of cold-worked Cu)
2841 (measurement of lattice parameters)
3244 (Cu-As system)
3364 (Th-Mn system)

11. METALS—TRANSFORMATIONS AND RESULTING STRUCTURES

2631 Preparation of Mo_3Ge and Determination of Its Structure. Alan W. Searcy, Robert J. Peavler, and H. J. Yearian. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 566-567.

Above compound or alloy was prepared by heating mixtures of Mo and Ge powders for several hours at 1000°C. Crystal structure and cell dimensions were determined by X-ray diffraction.

2632* An Experimental Investigation of the Diffusion of Electrolytic Hydrogen Through Metals. H. R. Heath. *British Journal of Applied Physics*, v. 3, Jan. 1952, p. 13-18.

An investigation was made on Fe, Ni, Co, Cu, Zn, Ag, Pd, Pt and Pb. A theory explaining the general character of the results is given. 12 ref.

2633 The Diffusion of Copper in Cuprous Oxide. Walter J. Moore and Bernard Selikson. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1539-1543.

Cu_2O strips were prepared by the oxidation of Cu at 1000°C. The diffusion of radiocopper in this material at 800 to 1050° gave a self-diffusion coefficient. It is suggested that parabolic rate constants with large negative entropies of activation and low heats of activation may be due to grain boundary diffusion. Data are graphed and tabulated.

2634 Solidification Mechanism of Steel Ingots. H. F. Bishop, F. A. Brandt, and W. S. Pellini. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 44-54.

The solidification mechanism of low- and high-carbon experimental steel ingots was studied by thermal analysis. It was determined that solidification proceeds in wave-like fashion at rates which are determined by the carbon level, superheat, and mold thickness. The thermal cycles of the mold walls are related to the course of solidification. Phase diagrams. 10 ref.

2635 Examination and Rehabilitation of Graphitized Welded Joints. I. A. Rohrig and R. M. Van Duzer. *Combustion*, v. 23, Jan. 1952, p. 36-42.

Reviews practice of Detroit Edison Co. in systematically checking high-temperature alloy-steel piping welds for signs of graphitization, also weld-deposition procedures employed to restore the welds. Micrographs, macrographs, and illustrations. 15 ref.

2636 Solidification of Metals. H. F. Bishop, and W. S. Pellini. *Foundry*, v. 80, Feb. 1952, p. 86-93, 253-261.

Summarizes recent information regarding the mode of solidification of important commercial metals. Discussions of basic factors which determine the specific mode of solidification and practical applications to the problem of producing sound castings are also included.

2637* Isothermal Transformation of Austenite. (In Swedish.) **I. Introduction.** Axel Hultgren. **II. Transformation Diagram and Structures.** Axel Hultgren and others. **III. Distribution of Alloy Steels.** Kehsin Kuo and Axel Hultgren. **IV. Discussion of Results Obtained.** Axel Hultgren. **Appendix I. Preparation for Microscopic Investigation.** Axel Hultgren and Kai Tikkanan. **Appendix II. Isolation and Chemical Analysis of Carbides in Steels.** Kehsin Kuo. *Jernkontorets Annaler*, v. 135, no. 8, 1951, p. 403-483; disc., p. 483-494.

Continuing an earlier investigation, several ternary alloy steels of low alloy contents, and with usual amounts of Si, Mn, P and S, were examined. In most of them, cementite was the only carbide constituent present. Isothermal transformation rates and structures were studied and TTT diagrams obtained. The carbide constituent was isolated electrolytically, X-rayed and analyzed: after tempering of martensite at constant temperatures for different periods at that temperature, and in bainite, as freshly formed near the nose temperature and after subsequent holding at different temperatures. Numerous graphs, diagrams, and photomicrographs. 18 ref.

2638 Annealing Textures in Rolled Face-Centered Cubic Metals. Paul A. Beck and Hsun Hu. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 83-90.

Presents results of an investigation undertaken to examine in detail the orientation relationship between deformation texture and recrystallization texture in rolled face-centered cubic metals, using the quantitative methods of texture determination that have recently become available. Metals investigated were Al, Cu, and brass. Quantitative pole figures for annealing textures are given. 40 ref.

2639 On the Solution of Diffusion Problems Involving Concentration-Dependent Diffusion Coefficients. Carl Wagner. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Mining and Metallurgical Engineers*, v. 194, 1952, p. 91-96.

Contains solutions of the differential equation of diffusion in binary alloys if the diffusion coefficient is an exponential function of the concentration of one of the components.

2640 A Method of Growing Single Crystals of Lead Telluride and Lead Selenide. W. D. Lawson. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1444-1447.

Describes the above. Crystals were grown for the purpose of testing the semiconducting and allied properties of PbTe and PbSe.

2641 Deformation of Body-Centered Cubic Metals. E. A. Calnan, and C. J. B. Clews. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1508.

Discusses recent results of Opinsky and Smoluchowski. Operative slip systems for unequal and equal coilical shear stresses are shown in diagrams.

2642 Growth of Austenite in Cold-Rolled Tempered Martensite. A. E. Nehrenberg. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 181.

In the above study, it was pointed out that in cold-rolled tempered martensite, austenite grows in an equiaxial, rather than an acicular manner. Results of an experiment carried out to and in understanding of this behavior are illustrated by micrographs.

2643 Kinetics and Orientation Relationship of Secondary Recrystallization in Silver. F. D. Rosi, B. H. Alexander, and C. A. Dube. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 189-196.

The above phenomenon was investigated in the range 433-533°C. Results show that secondary grains have a preferred orientation which corresponds closely to that of the original deformation texture. Micrographs and graphs are given. 17 ref.

2644* The Position of the A_r''' Point in Chromium-Nickel Stainless Steel and Its Displacement by Cold-Working. (In French.) Paul Bastien and Jacques Dedieu. *Métaux: Corrosion—Industries*, v. 26, Nov. 1951, p. 423-426.

Briefly describes methods and results of investigation of above. The influence of Ni on the lowering of the A_r'' point is described in particular. Includes diagrams and charts.

2645 Pressure Effects of Argon and Helium on the Resonance Lines of Silver. Eugene D. Clayton, and Shang-yi-Ch'en. *Physical Review*, ser. 2, v. 85, Jan. 1, 1952, p. 68-70.

Presents results of an investigation on the above. Data are graphed and tabulated.

2646* Growth Twins in Cadmium. D. S. Oliver. *Research*, v. 5, Jan. 1952, p. 45-46.

Briefly describes and illustrates the above. Discusses mechanism of formation.

2647* Experimental Demonstration of Two Types of Solidification Occurring During Plastic Deformation of Crystals. (In German.) Fritz Röhm and Werner Sautter. *Zeitschrift für Metallkunde*, v. 42, Oct. 1951, p. 289-293.

Describes, charts, and diagrams the above as applied to Al single crystals. Dependence of the recovery upon various factors is indicated. 10 ref.

2648* A New Point of View on the Theory of Metal Solidification. (In German.) Jakob Bingel. *Zeitschrift für Metallkunde*, v. 42, Oct. 1951, p. 309-315.

Describes a new theory, according to which solidification curves are deduced analytically on the basis of the mechanical notch effect within the crystal. The theory is based upon the phenomenon of crystal division, causing an increase in the internal energy of the crystal. The hardening of metals is discussed on the same basis. 21 ref.

2649* The Gamma Phase of Manganese. II. High Temperature X-Ray Diagrams in the Gamma-Phase Region. (In German.) Ulrich Zwicker. *Zeitschrift für Metallkunde*, v. 42, Nov. 1951, p. 327-330.

Describes method for investigation of transformations in the above. Results are discussed. Data are tabulated and charted.

2650* The Lamellar Growth of Crystals. I. Experimental Part. (In German.) Ludwig Graf. *Zeitschrift für Metallkunde*, v. 42, Nov. 1951, p. 336-340.

Describes method for obtaining very rapidly cooled samples showing intermediate, lamellar crystalline growth. Results show that both lamellar and dedritic structures are basic phenomena in crystal growth, differing according to crystal type. Excellent micrographs show results obtained with Cu, Zn, W, Cd, Pb, Au, and NaCl.

Miscellaneous Publications

2651 Law of Approach to Saturation for Martensite. N. S. Akulov and K. M. Bol'shova. Henry Brutcher, Translation 2698, 9 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 71, Apr. 1, 1950, p. 633-636.)

Previously abstracted from original.

2652 Influence of Boron and Vanadium Upon the Kinetics of the Isothermal Transformation of Austenite. S. D. Brik, V. E. Neimark, and R. I. Entin. Henry Brutcher, Translation 2759, 11 pages. (From *Stal*, v. 6, nos. 11-12, 1946, p. 661-666.)

Describes procedure and results of an investigation on the above. Gives results of a determination of optimum additions of B and V for increased stability of austenite and improved hardenability of 1%-C and 0.50%-C steel.

2653 Apparatus for Study of Columnar Crystallization in Metals and Alloys. P. P. Petrosyan and S. E. Shou-Shakhbudagyan. Henry Brutcher, Translation 2764, 4 pages. (From *Zavodskaya Laboratoriya*, v. 15, Feb. 1949, p. 248-249.)

Describes the above. A study of the influence of temperature of superheating on columnar crystallization of aluminum was made. Macrostructures of specimens obtained at 3 casting temperatures and 3 rates of heat abstraction are given.

2654 Alpha-Gamma Transformation in the Iron-Chromium-Manganese System. A. T. Grigor'ev, D. L. Kudryavtsev, and N. M. Gruzdeva. Henry Brutcher, Translation 2786, 16 pages. (From *Zhurnal Prikladnoi Khimii*, v. 23, June 1950, p. 566-574.)

Presents results of an investigation on the above for alloys of two types: containing a constant proportion of Mn (4 and 8%); and a variable portion of Cr.

See also:
2454 (crystallization vs. fluidity of Sn-Bi and Pb-Sn)
2484 (interdiffusion in Cu-Ni compacts)
2528 (isothermal transformation of steel)
2530 (austenite transformation in steel welds)

12. METALS—PHYSICAL PROPERTIES AND TESTS

2655* The Temperature Despendence of Magnetic Strength of Ferromagnetic Metals. (In Russian.) E. F. Kuritsyna. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 11, 1951, p. 233-236.

Magnetic strengths were determined experimentally from 86 to 1013°K. for Fe and from 86 to 1073°K. for Co. Results are charted and discussed.

2656* Resistivity of Single-Phase Monovalent Metals. (In Russian.) N. V. Grum-Grzhimailo. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 461-462.

The electrical resistivity of Au-Ag and Ca-Rb alloys was investigated. Results are discussed and charted.

2657 The Solubility of Bismuth in Mixtures of Bismuth Chloride With Other Chlorides. George Cleary and Daniel Cubicciotti. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 557.

2658* Interception of Heat Rays With the Aid of Metallic Sheets. (In French.) Victor Broida. *Chaleur et Industrie*, v. 32, Dec. 1951, p. 347-352.

Presents results of a study on the protection of persons and objects against rays from incandescent sources by means of metallic sheets, and describes a mathematical system explaining the theory of this technique. Includes graphs and tables for sheets of brass, bronze, copper, and steel.

2659* Thermomagnetic Analysis. (In German.) H. Merkel. *Chemie-Ingenieur-Technik*, v. 23, Dec. 21, 1951, p. 570-575.

Describes the principles of ferromagnetism and of magnetic scales. Directions for performing the measuring are given; and alloys and catalysts, especially for Fischer-Tropsch synthesis, are cited as examples of application of thermomagnetic analysis. Diagrams, graphs, and tables. 15 ref.

12. *Metals—Physical Properties and Tests*

2660 The Adsorption on Metal Surfaces of Long Chain Polar Compounds From Hydrocarbon Solutions. S. G. Daniel. *Transactions of the Faraday Society*, v. 47, Dec. 1951, p. 1345-1359.

In studies of the above with certain metals, notably Cu, Pb, Zn, and Cd, the isotherms could not be determined because of reactions between the acid and oxide films on the metal surface. In general, ease of adsorption increases with increasing chain length and, for a given chain length, the acid is most strongly adsorbed and the ester least, with the alcohol intermediate. The influence upon adsorption of other factors such as temperature and solubility is discussed. In some cases it was possible to calculate free energy and heat of adsorption. Data are graphed. 17 ref.

2661 Contact Potential Variations on Freshly Condensed Metal Films at Low Pressures. Leland L. Antes and Norman Hackerman. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1395-1398.

The reason for contact differences of potential is discussed. The results indicate characteristically different behavior for each of the 6 metals studied. Electrical-resistance measurements made on similar metal films under similar conditions are correlated with contact potential measurements. Studies were made on Al, Cu, Au, Ni, Fe and Cr.

2662 Volta Potentials of the Copper-Nickel Alloys and Several Metals in Air. Herbert H. Uhlig. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1399-1403.

It is shown that the above can reliably, and consistently differentiate between many metals of the Periodic Table. Also, effects of electronic interaction between Ni and Cu in alloys of these metals can be detected and reproduced. Furthermore, it is shown that the Volta potential, as usually measured, is an average of surface phases weighted in accord with the area of each phase exposed.

2663 Heats of Formation of Sodium-Tin Alloys Determined With a New High Temperature Calorimeter. Raleigh L. McKisson and LeRoy A. Bromley. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 33-38.

A high temperature calorimeter designed for use up to 1500°K. is described, and the theory of its operation presented. This calorimeter was used to measure the heats of formation of Na-Sn alloys ranging in composition from Sn to Na_2Sn. The values tend to support those reported by Kubaschewski and Seith. Graphs and tabulated data. 15 ref.

2664 Low Melting Gallium Alloys. R. M. Evans and R. I. Jaffee. Journal of Metals, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 153-156.

Presents results of an investigation of the properties of the above. Includes information on the effects of binary additions on the melting point of Ga, and its corrosive action on other metals and alloys. Phase diagrams. Data are tabulated for Ga-Sn-Zn and Ga-Sn-Zn-Al alloys.

2665 Effect of Cold Work and Annealing on the Thermoelectric Power of Molybdenum. J. Howard Kittel. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 196.

Data on the above investigation are graphed.

2666* A Ferromagnetic Phase in the Nickel-Manganase-Antimony System. (In German.) L. Castelliz. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, Dec. 15, 1951, p. 1059-1085.

A number of above alloys were radiographically investigated, and their saturation magnetization and Curie temperatures measured. Magnetic moments of the atoms were computed. Tables, graphs, and X-ray diagrams illustrate the results. 14 ref.

2667* Engineering Aspects of Liquid Metals for Heat Transfer. Thomas Trocki. *Nucleonics*, v. 10, Jan. 1952, p. 28-32.

Work accomplished with development systems indicates that liquid metals hold considerable promise as reactor coolants and heat-transfer fluids for systems operating above 600°F. Comparative physical properties of Na, NaK, "Heat-transfer salt," Dowtherm A, Hg, Pb, Pb-Bi eutectic, Li, and H_2O are tabulated. Discusses handling and safety problems, system design and construction, liquid-metal heat exchangers, advantages of liquid metals in pumping and instrumentation, and purification of liquid metals.

2668 An Interferometric Method for the Determination of the Absorption Coefficients of Metals, With Results for Silver and Aluminum. L. G. Schulz. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 1047-1051.

Method described utilizes the change in phase accompanying the reflection of light at normal incidence. The reflecting layers in an interference filter are made of the metal being studied. From the optical thickness of the dielectric between the reflecting layers and the wavelength of the light transmitted, the phase change can be calculated. 13 ref.

2669 The Magnetic Susceptibility of Uranium. C. J. Kriessman, Jr., and T. R. McGuire. *Physical Review*, ser. 2, v. 85, Jan. 1, 1952, p. 71-72.

Using a body-force method the above was measured as a function of temperature. Results are charted and compared with those of other investigators. 12 ref.

2670 Superconductivity of Vanadium. Aaron Wexler, and William S. Corak. *Physical Review*, ser. 2, v. 85, Jan. 1, 1952, p. 85-90.

The above investigation indicates that the magnetic properties exhibited by most specimens of the so-called hard superconductors are due to internal strain arising from either mechanical work or interstitially located impurities such as C, N_2, and O_2. The very large effects of small concentrations of these impurities on the superconductive properties can be understood on this basis. 30 ref.

2671 Magnetic Properties of a Hollow Superconducting Lead Sphere. Julius Babiskin. *Physical Review*, ser. 2, v. 85, Jan. 1, 1952, p. 104-106.

The above was studied by measuring the magnetic field distributions along the equatorial plane with bismuth probes. After cooling in the absence of a magnetic field, the hollow sphere was found to be a perfect magnetic shield in the superconducting state.

2672 Optical Properties of Tellurium in the Infra-Red. T. S. Moss. *Proceedings of the Physical Society*, v. 65, sec. B, Jan. 1, 1952, p. 62-66.

The refractive index and absorption constant of Te layers were measured in the near infrared. The refractive index was measured over the wavelength range 3-11 μ. The value extrapolated to long wavelengths was found to be 4.8; this is much higher than any other known refractive index.

2673 On Θ Values in the Resistance of Metals. P. G. Klemens. *Proceedings of the Physical Society*, v. 65, sec. A, Jan. 1952, p. 71-72.

Discusses the above in relation to temperature.

2674 The Densities of Nickel-Cobalt Alloys. (In English.) Mikio Yamamoto. *Science Reports of the Research Institutes, Tohoku University*, v. 2, sec. A, Dec. 1950, p. 871-877.

A detailed investigation was made on the above. The density vs. composition relationships for the α-phase and ϵ-phase alloys are expressed by equations. Data are tabulated and graphed. 11 ref.

2675 On the Mechanism of Magnetic After-Effect of a Ferromagnetic Substance. (In English.) Seiziro Maeda. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 2, Dec. 1950, p. 878-889.

A theory for the magnetic after-effect was proposed, taking into account the irreversible displacement of the domain boundaries in a ferromagnetic substance. According to the theory, the characteristic nature of the after-effect does not change within wide ranges of magnetic field, tension applied, and temperature. A simple formula for approach to equilibrium in magnetization was given on the basis of the theory.

2676 Absorption of Nitrogen by Molten Iron Alloys. III. Study on Fe-C and Fe-Si Alloys. (In English.) Tunezo Saito.

Science Reports of the Research Institutes, Tohoku University, ser. A, v. 2, Dec. 1950, p. 909-916.

The absorption phenomena of nitrogen by molten Fe-C and Fe-Si alloys was studied.

2677 A Ferromagnetic Hysteresis Potentiometer. Harold Aspiden. *Review of Scientic Instruments*, v. 22, Dec. 1951, p. 869-871.

Discusses construction principles and method of operation of the above.

2678 Magnetization Hysteresis Loop Tracer for Long Specimens of Extremely Small Cross Section. E. C. Crittenden, Jr., A. A. Hudimac, and R. I. Strough. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 872-877.

An instrument for measurement of the low-frequency magnetic properties of thin layers is described.

2679 The Work Functions of Copper, Silver, and Aluminum. E. W. J. Mitchell and J. W. Mitchell. *Proceedings of the Royal Society*, ser. A, v. 210, Dec. 7, 1951, p. 70-84.

Presents results of a study of changes in the work functions of metallic surfaces which result from adsorption of O_2 and formation of oxide films upon them. Cu, Ag, and Al were used for these experiments, because they show 3 distinct types of behavior when they react with O_2. 22 ref.

2680* Resistance Anomalies of a Highly Permeable Nickel-Iron-Molybdenum Alloy. (In German.) Fritz Assmus and Friedrich Pfeifer. *Zeitschrift für Metallkunde*, v. 42, Oct. 1951, p. 294-299.

Describes and diagrams experiments on the above applied to an alloy containing 79% Ni, 5% Mo, remainder Fe. Results of various heat treatments are indicated. 16 ref.

Miscellaneous Publications

2681 Optical Properties of Surface Films. Alexandre Rothen. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 1054-1063. (Q11 N49a)

Discusses optical phenomena occurring on reflection of light from a metallic surface coated with a film, and especially their application to determination of thickness of the film.

2682* A Cryoscopic Study of the Solubility of Uranium in Liquid Sodium at 97.8°C. Thomas B. Douglas, U. S. Atomic Energy Commission, AECD-3254, Mar. 12, 1951, 8 pages. (UF767 Un3m)

With an average reproducibility of approximately ± 0.001°C., measurements were made of equilibrium temperatures at various stages of melting from 70 to 100% complete, of 3 samples of Na. One sample contained U in bulk form and one sample contained finely divided U.

See also:
2396 (physical properties of directly reduced steels)
2406 ($Si-O_2$ equilibrium in liquid Fe)
2407 (reduction of oxides and sulfides to metals)
2433 (physical properties of Cu-Ni castings)
2490 (explosive properties of metal powders)
2560 (electrical properties of chromated Al)
2594 (properties of thin films on Cr)
2719 (heat treatment vs. properties of Ni-Mn alloys)
2965 (physical properties of Cu-clad Al)
2967 (connecting-rod-bearing materials)
2980 (hazardous properties of Zr)
3087 (density of boron carbide cermets)
3244 (energy of dissociation of Cu arsenide)
3365 (conductivity of metals)
3571 (electrical properties of thin metallic films)
3605 (thermomagnetic properties—theory of)
3696 (thermoelectric properties of materials)

13. METALS—MECHANICAL PROPERTIES AND TESTS

2683* Creep Under Complex Stress Systems at High Temperatures. A. E. Johnson. *Aircraft Engineering*, v. 24, Jan. 1952, p. 6-16.

The materials studied were a cast 0.17%-C steel, an Al alloy (R.R. 59), a Mg alloy (containing 2% Al), and a Ni-Cr alloy (Nimonic 75). Each material was tested at temperatures within its normal working range. Data are tabulated and graphed.

2684* Vanadium Steels for Castings; Higher Tensile and Impact Strengths. *Alloy Metals Review*, v. 8, Dec. 1951, p. 2-6.

Surveys above properties. Data are tabulated.

2685 The Creep and Stress-Rupture Testing of Steam-Boiler Materials. J. B. Romer, and H. D. Newell. *Transactions of the American Society of Mechanical Engineers*, v. 74, Feb. 1952, p. 157-172; disc., p. 172-174.

The significance of the time factor in testing in relationship to long-life, high-performance, steam-generating equipment is discussed as are the general effects of metal oxidation from steam and combustion atmospheres. Relative merits of long-time creep tests and stress-rupture tests are considered, and typical test data are cited for each form of test. Gives suggestions for temperature limits for superheater-tube materials and a resume of field experience on carbon and alloy steels. 32 ref.

2686* Iron and Steel Structures. J. L. Beckel, chairman, *American Railway Engineering Association Bulletin*, v. 53, Jan. 1952, p. 507-609.

A committee report including design of expansion joints involving iron and steel structures; stress distribution in bridge frames; design of steel-bridge details; preparation and painting of steel surfaces; use of high-strength structural bolts in steel railway bridges; and means of conserving labor and materials, including adaptation of substitute noncritical materials, and specifications for reclamation of released materials, tools and equipment.

2687* Review of the Fatigue of Materials Field. R. E. Peterson. *Applied Mechanics Reviews*, v. 5, Jan. 1952, p. 1-3.

51 references.

2688 The Crystallographic Aspect of Slip in Body-Centered Cubic Single Crystals. II. Interpretation of Experiments. A. J. Opinsky and R. Smoluchowski. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1488-1492.

A new method for determining the ratios of critical shear stresses was applied to data taken from the literature and to original results. Measurements of yield strength were found to be not too satisfactory for the investigation of the slip behavior of body-centered cubic materials. On the other hand, any method which determined the slip plane and the orientation of the tensile axis gave useful results. Graphs and charts.

2689 The Notch Toughness Test of Henri Schnadt. Wendell P. Roop. *ASTM Bulletin*, Jan. 1952, p. 61-64.

Discusses the above. Material under compression is removed in such a way that fracture occurs in tension, which is only moderately eccentric. 10 ref.

2690 Fatigue Tests Under Axial Loads of Aluminum Joints Bonded With a Resinous Adhesive. W. N. Findley, B. A. Century, and C. P. Hendrickson. *ASTM Bulletin*, Jan. 1952, p. 67-71; disc., p. 71.

Describes the above. Single-lap, double-lap, and butt joints were tested in an axial-load fatigue machine. The methods of testing, merits of 3 procedures employed, and test results obtained are discussed. The fatigue strength at 10^7 cycles was found to be about 3 times as large for the butt joints as for the lap joints. It is indicated that differences in state of combined stress may account for some of the observed differences in test results.

2691* Fatigue of Steels; Data on Fatigue and Their Application to Design. *Automobile Engineer*, v. 42, Jan. 1952, p. 35-40. (Based on "The Fatigue Strength of Steels," by R. J. Love.)

Describes something of the nature of fatigue and the nature of presentation of data. Application of data such as S-N diagrams and Goodman diagrams to design is discussed.

2692* Influence of Low-Temperature Heat-Treatment on Creep Resistance. (In French.) Georges Delbart and Michel Ravery. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Dec. 3, 1951, p. 1455-1457.

Long-time aging of a steel containing 0.12% C, 0.6% Cr, and 0.6% Mo was studied at 450 and 575° C., showing that it has a favorable influence on above property of a series of phases:

13. *Metals—Mechanical Properties and Tests*

ferrite-pearlite; higher ferrite-bainite; ferrite-bainite-sorbite; 2 sorbites; and 3 lower bainites.

2693 A Creep Test Research Station. *Engineer*, v. 193, Jan. 25, 1952, p. 136-137.

Describes the above which has recently been established at the Kynoch Works, Witton, Birmingham, England.

2694 Shortcomings of Structural Analysis. J. F. Baker. *Engineering*, v. 173, Jan. 11, 1952, p. 57-59; Jan. 18, 1952, p. 92-93.

Presents a detailed discussion on the above. Tests were made on bars of rolled mild steel.

2695* Creep-Test Research Station. *Engineering*, v. 173, Jan. 25, 1952, p. 107-108.

Describes the above erected by Imperial Chemical Industries, Ltd., for the study of creep in metals.

2696* Contribution to the Study of Foundry Brasses. (In French.) Marcel Cirou and Pierre-Julien Le Thomas. *Fonderie*, Dec. 1951, p. 2715-2728.

The influence of additions of P, Si, and Al on mechanical characteristics, structural factors, and castability of Cu-Zn alloys was studied. Two types of brasses are discussed: one with a Cu content between 70 and 72%, and the other between 59 and 62%. Includes diagrams, tables, charts, and photomicrographs.

2697 Power Plant Piping. Hugh Welshman, Jr. *Heating, Piping & Air Conditioning*, v. 24, Jan. 1952, p. 135-142.

A detailed discussion of piping systems. Covers design, manufacture, fabrication, installation and operation. Includes tabular data on mechanical properties and other specifications for ferrous metals and alloys used in various locations. (To be continued.)

2698* Navy Investigates Weld Fracture Problems. *Industry & Welding*, v. 25, Feb. 1952, p. 38-39, 71.

Explosion-bulge testing of welds in heavy steel plate provides relatively low-cost method of evaluating structural performance and furnishes basic information needed for investigation of the weld-fracture problem.

2699* Steam Piping for High Pressures and High Temperatures. R. W. Bailey. *Institution of Mechanical Engineers, Proceedings*, v. 164, no. 3, 1951, p. 324-335; disc., 336-350.

Discusses distribution of stress in pipes, the accompanying creep, and their application to the rational and economical design of steam piping; the determination of permissible working stress; differences in American and British procedures and consequent differences in stress magnitudes; tentative considerations of behavior of ferritic and austenitic steels, and the action of creep at operating pressure and temperature in reducing and removing the initial thermal expansion loading of a pipeline, and in imposing it fully when cold. Deals with the problem of making a joint between ferritic and austenitic steel piping and components, and factors of materials and corrosion.

2700 Rare Earths Increase High Temperature Properties of Magnesium. K. Grube. *Iron Age*, v. 169, Jan. 17, 1952, p. 102-105.

States that additions of Misch metal up to 2% increase the creep resistance of Mg extrusion alloys. Ni and Mn also improve high temperature properties at 600°F. A fluosilicic-acid treatment gives these Mg alloys good protection against oxidation up to 700°F. 3-in. billets extruded to ¾-in. were tested. Tabulated and illustrated data.

2701 Heat Treated Properties Predictable in Complex Assemblies. J. L. Waisman. *Iron Age*, v. 169, Feb. 7, 1952, p. 146-149.

Describes technique used, for any shape of heat-treatable parts, for specifying heat-treatment. The system consists of a simple scheme for determining the diameter of a cylinder whose center has the same cooling rate as the center of the part in question. This diameter is called the "equivalent round" for that shape.

2702* Properties of Spinning Pins. (In Japanese.) Kunio Futaki. *Journal of Mechanical Laboratory*, v. 5, Sept. 1951, p. 217-220.

Refers to pins used in spinning machines. Discusses present mechanical-test methods and their drawbacks. Suggests microbend test apparatus and procedure for this application. Diagram and graphs.

2703* The Micro Bending Test Machine. (In Japanese.) Kunio Futaki. *Journal of Mechanical Laboratory*, v. 5, Sept. 1951, p. 221-224.

Describes and illustrates above apparatus designed for testing of spinning-machine pins. Typical data are charted and tabulated.

2704* The Effect of Wear of the Several Metals Against Clay Particles. (In Japanese.) Tamaki Watanabe. *Journal of Mechanical Leboratory*, v. 5, Sept. 1951, p. 225-230.

Presents results of investigation on the above for various ferrous and nonferrous metals and alloys, especially Ni, Fe, Cu, and Al. Tables and graphs.

2705 Rolling Textures in Face-Centered Cubic Metals. Hsun Hu, P. R. Sperry, and Paul A. Beck. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 76-81.

Quantitative pole figures were determined for both the internal texture and the surface texture of highly rolled 2S Al, tough-pitch Cu, and commercial 70-30 brass strips with two different rolling procedures: rolled in the same direction in successive passes, and rolled by reversing the strip end to end between successive passes. Results are discussed and diagrammed. 15 ref.

2706 Twinning in Silicon. E. I. Salkovitz and F. W. von Batchelder. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, p. 165.

Describes results of an investigation on the above, produced during slow cooling. Micrographs.

2707 Tensile Properties of Wrought Austenitic Manganese Steel in the Temperature Range From +100° to −196°C. H. C. Doepken. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 166-170.

Flow and fracture stresses, as well as conventional properties, were determined. Ductility and related properties, such as fracture stress, decreased continuously with temperature. Peculiarities during straining indicated possible martensite formation or mechanical twinning. 13 ref.

2708 Dislocation Collision and the Yield Point of Iron. A. N. Holden. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 182-188.

Studies of the above extend the dislocation mechanism to account for localized cataclysmic flow by a dislocation-collision process and provide experimental evidence to support such a process. Only the yielding of iron containing carbon is discussed, although other metal-solute systems are known to behave similarly. 20 ref.

2709 Cast Molybdenum of High Purity. G. W. P. Rengstorff and R. B. Fischer. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 157-160.

A study was made of the effect of impurities on the bend ductility of the above. High-purity Mo was prepared by remelting under high vacuum. The ductility of "transverse-grain" specimens indicated that intergranular brittleness decreased with an increase of purity of the metal.

2710 Internal Friction Measurements on Iron Wires of Commercial Purity. Ake Josefsson and Eric Kula. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 161-165.

The internal friction method of determining carbon and nitrogen in solid solution in α-Fe was applied to some steels of commercial purity. The presence of impurities, such as Mn and perhaps P, changed the position of the internal-friction curve for nitrogen and broadened it. Micrographs.

2711 Delay Time for the Initiation of Slip in Metal Single Crystals. I. R. Kramer and R. Maddin. *Journal of Metals*, v. 4, Feb. 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 197-203.

The above was studied in single crystals of α-brass, aluminum, and β-brass. A delay time for slip was found in β-brass when the specimens were tested below room temperature; however, one was not found for α-brass or Al. A general theory for the existence of the brittle transition temperature is proposed. 13 ref.

2712 Wearproofing Machine Elements. Paul B. Berlien. *Machine Design*, v. 24, Jan. 1952, p. 123-126.

Describes and discusses the use of cemented carbides for wearproofing basic machine parts. Gives some examples of this application as well as data on how the carbide is applied.

2713* New Method of Determining Endurance Limit of Steel and Other Materials. *Machinery* (American), v. 58, Feb. 1952, p. 153.

Describes a new development called Dilastrain developed at Rensselaer Polytechnic Institute. Method is based on precise measurements of the extent to which specimens of a given material will expand under controlled temperatures. The apparatus is applicable to metals, alloys, or plastics.

2714 The Working of Metals. (Concluded.) W. C. F. Hessenberg. *Metal Industry*, v. 80, Jan. 11, 1952, p. 23-25; Jan. 18, 1952, p. 50-53.

A study, giving results, of the efficiency of metal deformation processes. Compares use of plasticine and calculations for obtaining strain patterns.

2715 A New Version of "Strength of Materials." Archibald C. Vivian. *Metallurgia*, v. 45, Jan. 1952, p. 29-37.

Presents the case for a new theory of the above, based on effects of atomic or lattice changes under metallurgical treatments. The author is extremely critical of generally accepted theories.

2716* Fatigue Strength of Metals: Notched Parts. (In Italian.) Mirko Ros. *Metallurgia Italiana*, v. 43, Dec. 1951, p. 512-520.

Results of experiments on various steels, pure Al, Al alloys, etc., are tabulated, charted, and illustrated. Data are correlated showing relationship between fatigue limit and notch coefficient (maximum notch stress divided by mean notch stress.) Size and internal-stress effects are also shown.

2717 Production and Properties of Discs for Aircraft Gas-Turbine Engines. H. W. Kirkby. *Metal Treatment and Drop Forging*, v. 19, Jan. 1952, p. 3-11.

Describes the types of steel and other high-temperature alloys now available for gas-turbine discs. Mechanical properties and scaling resistance are discussed in detail. Data are graphed and tabulated. 11 ref.

2718 Elastic Elongation of Chains. L. H. Whitney and P. M. MacDonald. *Product Engineering*, v. 23, Feb. 1952, p. 176-177.

Results of many tests on the above extending over a considerable length of time have been compiled and developed into chart form. Thse charts are the summation of averages and limits computed for each individual chain size by statistical quality-control methods. Confined to steel roller, conveyor, and cable chains.

2719 The Measurement of the Young's Modulus of Metals and Alloys by an Interferometric Method. II. The Influence of Heat-Treatment on the Young's Moduli and Densities of Ni-Mn Alloys. (In English.) Tadao Fukuroi and Yoshio Shibuya. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 2, Dec. 1950, p. 829-836.

Describes an investigation on the above. Data are graphed and tabulated.

2720 The Effect of the Low-Temperature Annealing Upon the Fibrous Structures of Highly Cold-Worked Copper. (In English.) Masayuki Kawasaki. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 2, Dec. 1950, p. 861-870.

The fibrous structures developed in Cu, cold-drawn as highly as 80% or more, were investigated by X-ray analysis. The most outstanding result was that in the central portion of the wire, the fibrous character made more evident than in the cold-worked state due to annealing at 60°C. for 1 hr. after cold-working. These changes are believed to be caused most probably by crystal hardening or strengthening resulting from such crystal reorientation.

2721 Nitrogen as the Alloying Element in Steels. I. On the Effect of Nitrogen on the Temper-Brittleness in Steels. (In English.) Yunoshin Imai and Tetsuro Ishizaki. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 2, Dec. 1950, p. 890-908.

In the above investigation, the effect of nitrogen was first examined with the impact test on carbon steels and on low-Mn steels, both containing different amounts of nitrogen. Al and Ti were studied as fixers of nitrogen. From these investigations it was clear that the temper-brittleness decreases or almost disappears upon addition of these elements. Data are graphed and tabulated.

2722* Some Problems of Heat-Resistant Steels From the Standpoint of the Consumer. (In German.) W. Stauffer. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 17, Dec. 1951, p. 353-364.

Deals primarily with problems that occur in the construction of steam and gas turbines, discussing test results for Cr-Mo steels (1% Cr and 1% Mo) and cast-Mo steel, including data on creep resistance and on the effect of combustion gases and ash components on these steels. A concluding section discusses briefly nondestructive testing of steel castings. Graphs, tables, and photographs.

2723* Machine for Wear Testing Gage Materials. (In Russian.) A. L. Chestnov. *Stanki i Instrument*, v. 22, Apr. 1951, p. 23-25.

The above machine is described, diagrammed, and illustrated.

2724 Creep and Stress-to-Rupture Properties of Pressure Vessel Steels. R. D. Wylie and H. Thielsch. *Welding Journal*, v. 31, Jan. 1952, p. 11s-19s; disc., p. 19s-26s.

Presents an interpretive engineering statement on the above. Includes a discussion on the effect of fabrication processes on steels used in pressure vessels. Data are tabulated and graphed. 15 ref.

2725 Dimensional Effects in Fracture. C. W. MacGregor and N. Grossman. *Welding Journal*, v. 31, Jan. 1952, p. 20s-26s.

Reports on the influence of size on the transition temperature from ductile to brittle fracture, the effect of various ratios of combined stresses on the brittle transition temperature, and the effect of combined stresses on fracture strength. Material tested was Ryerson VD (0.95% C) toolsteel. Graphs and micrographs. 18 ref.

2726 Fatigue Strength of Panels With Welded Angle Stiffeners. R. Weck. *Welding Research*, v. 5, Oct. 1951, p. 219r-249r.

A report of an investigation to determine the life of different types of welded joints in angle stiffeners attached to plates, when subjected to many repetitions of loading. Micrographs and diagrams.

Miscellaneous Publications

2727 Structural Carbon Steel With an Addition of Boron. Henry Brutcher, Translation 2752, 4 pages. (From *Automobil'naya Promyshlennost*, no. 7-8, 1946, p. 18-19.)

Presents a summary report on extensive tests conducted at Kor'kii Automobile Works, on boron-treated structural carbon steels with 0.20 and 0.040% carbon. Numerical data on their mechanical properties after heat treating, compared with boron-free steels, are given.

2728 Role Played by Boron With Respect to Fibrous Fracture in Heat-Treatable Steel. S. I. Sakhin, N. N. Rodionov, N. G. Vergazov, and A. D. Gurasov. Henry Brutcher, Translation 2758, 12 pages. (From *Stal*, v. 6, nos. 11-12, 1946, p. 666-672.)

Presents results of an investigation of the role of boron in the austenite transformation during quenching; of the susceptibility of boron-treated steel to temper brittleness; and of the

13. *Metals—Mechanical Properties and Tests*

development of constructional, heat-treatable, substitute steels. Micrographs.

2729 Mechanical and Corrosion Tests of Spot-Welded Aluminum Alloys. Fred M. Reinhart, W. F. Hess, R. A. Wyant, F. F. Winsor, and R. R. Nash. National Advisory Committee for Aeronautics, Technical Note 2538, Dec. 1951, 74 pages. (TL570 Un3t)

The above was studied on panels fabricated from Alclad 24S-T3, 24S-T3, R-301-T6, Alclad XB75S-T6, and XB75S-T6, all of 0.040-in. thickness; and R-301-T6 of 0.020-in. thickness. In the investigation, the conditions of exposure and protective effect of adjacent cladding were such that the localized corrosion did not proceed to a point where it affected the shear strength of the welds. Data are tabulated. Numerous micrographs.

2730 Fundamental Effects of Cold-Work on Some Cobalt-Chromium-Nickel-Iron Base Creep-Resistant Alloys. D. N. Frey, J. W. Freeman, and A. E. White. National Advisory Committee for Aeronautics, Technical Note 2586, Jan. 1952, 12 pages. (TL570 Un3t)

The influence of cold-working on the creep properties of an alloy containing 20% Co, 20% Cr, 20% Ni, and the balance Fe and on the same alloy modified by small additions of W alone or W, Mo, and Cb in combination was studied. It was concluded that the effects of cold-working on creep resistance were similar for all the alloys studied. Graphs are given.

See also:

2396 (mechanical properties of directly reduced steels)
2428 (mechanical properties of ZRE-1 Mg alloy)
2431 (gray iron for cylinder sleeves and liners)
2433 (mechanical properties of Cu-Ni castings)
2435 (lead-bronze alloy for internal pressure)
2460 (deformation properties of steels)
2473 (stress in metallic structures)
2480 (tensile and yield strength of Mg and Al alloy sheets)
2483 (mechanical properties of sintered Cu)
2491 (strength of joined Al cable)
2498 (mechanical properties of Al brazing and casting alloys)
2506 (mechanical properties of arc-welded Al bronze)
2508 (mechanical properties of welds in 15-35 Cr-Ni)
2509 (deformation of welded structure)
2510 (mechanical properties of steel welds)
2516 (hardness of steel parts—cyaniding effects)
2517 (mechanical properties of nodular irons)
2518 (rapid-quenched low-alloy steels)
2525 (hardness tests on drill steels)
2541 (stress reduction in electrodeposited Ni)
2570 (effects of Ti on mechanical properties of steel)
2591 (frictional properties of bearing metals)
2608 (mechanical properties of Fe-bearing cupronickels)
2633 (grain boundry diffusion in cuprous oxide)
2647 (plastic deformation of crystals)
2740 (mechanical properties of Al plate)
2958 (creep of Al under pressure)
2963 (carbon and low alloy steels at low temperatures)
2967 (connecting-rod-bearing materials)
2970 (wear resistance of rock-drill materials)
2971 (stress and wear of drill rod)
2975 (fatigue strength of Mg alloys)
2978 (strength properties of structural Al)
2979 (fatigue strength of Cu-Pb bearings)
3069 (mechanical properties of steel and Al connecting rods)
3085 (mechanical properties of Ti C-base cements)
3087 (mechanical properties of boron carbide cermets)
3142 (spring materials)
3147 (measurement of strain and stress)
3150 (steel stresses in reinforced concrete)

14. CORROSION

2731* The Question of Corrosion Fatigue. (In Russian.) G. V. Karpenko. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 11, 1951, p. 287-288.

Rotating-beam fatigue tests were made on steel specimens under various conditions of corrosion. Data are discussed and charted. Typical results are illustrated.

2732* Mechanism of the Protection of Iron Apparatus From Corrosion With the Aid of Inhibitors and Protective Agents. (In Russian.) I. L. Rozenfel'd. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 471-474.

The corrosion of iron structures in various electrolytes and under various protective conditions was studied. Results are discussed and charted.

2733 The Anodic Oxidation of Aluminum in Liquid Ammonia. William E. Bennett, Arthur W. Davidson and Jacob Kleinberg. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 732-735.

Deals with the behavior of Al as anode in a variety of electrolytes in liquid NH_3. Low initial valence numbers were observed only when the electrolyte contained the readily reducible nitrate ion.

2734 The Anodic Oxidation of Higher Members of the Aluminum Family in Liquid Ammonia. Albert D. McElroy, Jacob Kleinberg and Arthur W. Davidson. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 736-739.

Reports results of studies on Ga, In and Tl.

2735 Corrosion and Its Control in a Chemical Plant. Clyde W. Day. *Chemical Engineering*, v. 59, Jan. 1952, p. 154-157.

Describes what is being done by the Celanese Corp. at Bishop, Tex., in the above. Types of corrosion encountered are illustrated.

2736 Corrosion Problems Arising From Water in Chemical Industry. U. R. Evans. *Chemistry & Industry*, Dec. 31, 1951, p. 1193-1198; disc., p. 1198-1200.

Discuses corrosion and inhibition. Deals mainly with coolers and boilers, although other uses of water such as washing, rinsing, pressure transmission, seals for tanks, and fire extinguishing are mentioned. 53 ref.

2737 Experimental Approach to the Problem of Tuberculation by Waters. R. S. Thornhill. *Chemistry & Industry*, Dec. 31, 1951, p. 1201-1205; disc., p. 1205-1207.

Presents results of research on corrosion of steel and cast iron by tuberculating water.

2738* Decomposition of Oxide Films on Metal Surfaces in Acid Vapors and Mechanism of Atmospheric Corrosion. (In German.) W. Feitknecht. *Chimia*, v. 6, no. 1, Jan. 15, 1952, p. 3-13.

Describes experimental studies which show that corrosion is caused by impurities in the air, that corrosion occurs rapidly only above a humidity of about 70%, that Cu is protected by the products of corrosion, and that the product of corrosion of Fe is a hydroxide, while the other metals form normal and basic sulfate, or a mixture of sulfate and H_2SO_4. Tables, graphs, and electrom micrographs. 34 ref.

2739* Corrosion of Axle Shafts and Propeller Screws of Ships. (In French.) *Circulaire d'Informations Techniques*, v. 8, Dec. 1951, p. 1415-1419.

Discusses the above briefly, as observed on the "Rex" and the "Normandie," presenting causes and remedies. Materials discussed include cast irons, carbon and alloy steels, and manganese bronzes.

2740* Aluminum Alloys for Corrosion-Resistant Storage Tanks. E. C. Hartmann and Fred L. Plummer. *Civil Engineering*, v. 22, Feb. 1952, p. 25-27.

Discusses the above application. Tabular data shows Al alloys most frequently used in storage tanks, mechanical properties, and recommended minimum shell-plate thicknesses.

2741 Effectiveness of Cathodic Currents in Reducing Crevice Corrosion and Pitting of Several Materials in Sea Water. Thomas P. May and H. A. Humble. *Corrosion* (Technical Section), v. 8, Feb. 1952, p. 50-56.

Cathodic protection was shown to be useful in preventing crevice corrosion and pitting on Ni and Types 302 and 316 stainless steel when they are immersed in quiet sea water. The pitting of Monel in quiet sea water may also be prevented by cathodic protection. Types 410 and 430 stainless steels cannot be completely protected by cathodic currents because of the development by hydrogen blisters at current densities below that required for complete protection. Micrographs.

2742 A Field Investigation of Cathodic Protection in Glass Lined and Galvanized Water Heaters. W. A. Deringer and F. W. Nelson. *Corrosion* (Technical Section), v. 8, Feb. 1952, p. 57-64; disc., p. 63-64.

Evaluates the above. Results show how Mg anodes behave in both of above types of water heaters under a variety of water and performance conditions. Data are tabulated. Photographs.

2743 Some Aspects of Ship Bottom Corrosion. *Corrosion* (Technical Section), v. 8, Feb. 1952, p. 69-88.

A discussion on above paper by Paul Ffield, published in Jan. 1952 issue.

2744* Chemical and Thermodynamic Principles of the Corrosion of Metals in Aqueous Solution. II. Corrosion of Cadmium in Sodium Chloride Solution. (In German.) W. Feitknecht and E. Wyler. *Helvetica Chimica Acta*, v. 34, Dec. 1, 1951, p. 2269-2278.

Study of above shows that metallic corrosion is the result of the electrochemical properties of the metal, of the chemical and thermodynamic properties of the products of corrosion, and of changes in concentration of ions in the solution, especially, on the surface of the metal. Data are graphed and tabulated. 14 ref.

2745 Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 85A-86A, 88A.

Presents concentrations and temperatures for corrosion of high Si iron (Duriron) by H_2SO_4.

2746 Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 91A-92A, 94A.

Fifth of a series summarizing corrosion data in chart form. Presents concentrations and temperatures for corrosion of high Ni-Mo alloy by H_2SO_4.

2747 Polyphosphate Detergents in Mechanical Dishwashing. Solubilizing Action of Polyphosphates on Certain Metals. Leslie R. Bacon and Eugene G. Nutting, Jr. **Metallic Staining of Silverware.** Leslie R. Bacon and Eugene G. Nutting, Jr. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 146-155.

The solubilizing action of polyphosphates on metals was investigated. Under field conditions, the ability of polyphosphates in commercial dishwashing detergents to dissolve Cu, Zn, and brass from dishwashing-machine parts has been responsible for serious operating difficulties. A brassy tarnish on silverware washed in certain machines has been traced to Cu dissolved from the machine. Laboratory corrosion data are given for many commercial detergent formulas. The solubilizing action may be reduced by increased proportions of silicates in the washing solutions. Of the several polyphosphates investigated, pyrophosphate is the most difficult to inhibit in this way. In the second article, conditions under which metallic staining of silverware occurs during washing were studied. Dissolved Cu was found to be responsible. It electroplates onto the Ag when the ware is electrocoupled to actively dissolving metals, notably Zn. Corrosion data on various couple combinations of Ag, Cu, Monel, Fe, Zn, and Al in polyphosphate and polyphosphated detergent solutions are presented. The difficulties may be overcome by elimination of cuprous metals or strongly electronegative metals such as Zn or Al from the dishwashing system. Highly silicated detergents minimize the problem. Other practical suggestions are given.

2748* X-Ray Study of the Action of Oleic Acid on Lead. (In French.) J. J. Trillat and S. Barbezat. *Journal des Recherches du Centre National de la Recherche Scientifique*, no. 16, 1951, p. 18-20.

Influence of temperature on the above, as well as other factors, was investigated. Includes X-ray diagrams.

2749 Protective Finishes; Phosphate Coatings for Military Equipment. Part 2. Rustproofing and Protecting Friction Surfaces. Norman P. Gentieu. *Machine Design*, v. 24, Feb. 1952, p. 141-145, 222.

Discusses finishes such as Mn and Zn phosphates and their applications in military equipment.

2750 A Critical Look at Salt Spray Tests. F. L. LaQue, *Materials & Methods*, v. 35, Feb. 1952, p. 77-81.

Although widely accepted as a means of measuring the resistance of materials and finishes to corrosive environment, salt-spray tests are still highly controversial and are considered unreliable and misleading by many engineers. 11 ref.

2751 New Interleaving Paper for Aluminum Inhibits Water Stain. W. Y. Bleakley and C. C. Lacy. *Materials & Methods*, v. 35, Feb. 1952, p. 176, 178, 180.

Describes an investigation showing that sodium chromate was found to be the most effective chemical compound for the prevention of water stains in stacks of flat Al sheets.

2752 Corroded Nickel Buckles. H. H. Symonds. *Metal Industry*, v. 79, Dec. 28, 1951, p. 542.

Presents results of an investigation into the cause of the presence of visible rust stains on the elastic web of braces.

2753 From a Metallurgist's Notebook: Stained Aluminium Kettles. H. H. Symonds. *Metal Industry*, v. 80, Jan. 4, 1952, p. 5-6.

Gives results of an investigation to determine the cause and remedy of brown stains on Al kettles shipped to Australia and India.

2754* Copper Corrosion of a Circulating Evaporator. (In German.) L. W. Haase. *Metalloberfläche*, ser. A, v. 5, Nov. 1951, p. A170-A171.

Describes probable reasons for above corrosion. Suggests that addition of sulfurous acid or sulfides in order to eliminate oxygen content of water is the main reason for above corrosion.

2755 Marine Attack. Clyde Williams. *Monthly Business Review*, v. 34, Feb. 1952, p. 10.

Discusses the above problem. Describes recent research methods for determining extent of attack by marine organisms, and salt-water corrosion of metals and alloys, including processes devised for counterattack. Protective measures under study include: introducing Cu into wood preservatives, anti-fouling paint, corrosion-resistant alloys, and dehumidification equipment.

2756* How to Combat Heat-Exchange Corrosion. A. R. Dyer. *Oil and Gas Journal*, v. 50, Feb. 4, 1952, p. 69-84.

Results of investigations show that improved methods of cathodic protection and the development of new alloys appear to be the trend in the struggle against corrosion.

2757 Some Corrosion Problems in Petroleum Refineries. John F. Mason, Jr. *Petroleum Engineer*, v. 24, Feb. 1952, p. C10, C13-C14, C16-C18.

Presents an analysis of 15 problems encountered. Each specimen was examined for cracking, pitting, and other forms of local attack. Method of test was in accord with ASTM Recommended Practice for Conducting Plant Corrosion Tests. Metals involved include Ni, stainless, carbon steel, cast iron, Cu, and alloy steels.

2758 Corrosion Resistance of Copper-Nickel-Chromium Plated Zinc-, Aluminum- and Magnesium-Base Diecastings. M. R. Caldwell, L. B. Sperry, L. M. Morse, and H. K. Delong. *Plating*, v. 39, Feb. 1952, p. 142-148, 159-163.

Describes tests to determine how Cr-plated Zn-, Al-, and Mg-alloy diecastings compare as to rate and type of corrosion when exposed to different outside atmospheres; how much plate is required to furnish adequate protection for each; how different alloys of Al compare with each other, and how Watts Ni compares with bright Ni under these conditions. Micrographs. Data are graphed and tabulated.

2759* Silicates in Detergents. E. A. Robinson. *Soap and Sanitary Chemicals*, v. 28, Jan. 1952, p. 34-36.

Discusses the use of silicates to inhibit corrosion of light metals, Cu-Zn, Cu-Ni alloys, and vitreous enamels by carbonates, ortho and polyphosphates.

2760* Corrosion by Microorganisms. (In German.) H. O. Nicolaus. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Jan. 11, 1952, p. 39.

Describes briefly the chemistry of biologically caused corrosion and proposes some effective means of combating it.

2761* Electrolytic Activation of Passive Iron in Nitric Acid. (In German.) Klaus J. Vetter. *Zeitschrift für Elektro-*

14. *Corrosion*

chemie und angewandte physikalische Chemie, v. 55, Dec. 1951, p. 675-683.

Describes in detail experimental procedure and results. Dissolved iron was microanalytically determined and the function of concentration of HNO_3 was theoretically computed. Diagrams and graphs. 24 ref.

Miscellaneous Publications

2762 Topochemistry and Kinetics of Corrosion Processes. W. Machu. Henry Brutcher, Translation 2682, 29 pages. (From *Archiv für Metallkunde*, v. 3, Jan. 1949, p. 1-7.)

Previously abstracted from original.

2763 Relation Between Phase Diagram of an Alloy and Its Susceptibility to Corrosion. Yu. A. Klyachko and S. A. Shapiro. Henry Brutcher, Translation 2709, 6 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 72, June 1, 1950, p. 707-709.)

Previously abstracted from original.

2764 Effect of of Pressure Upon Rate of Dissolution of Steel in Sulfuric Acid. S. A. Balezin and A. G. Tulaeva. Henry Brutcher, Translation 2772, 6 pages. (From *Doklady Akademii Nauk SSSR*, new ser., v. 78, no. 1, 1951, p. 75-77.)

Elucidates causes of the above phenomenon. Explains the relationship between effect of retarding and accelerating agents, respectively, and pressure over the acid.

2765 Report of the Chemistry Research Board With the Report of the Director of the Chemical Research Laboratory for the Year 1950. Dept. of Scientific and Industrial Research, His Majesty's Stationery Office (London), 1951, 104 pages. (TP193.G7 G79r.)

The main lines of research at present in progress include corrosion of metals; high polymers and plastics; new techniques; less common elements including radioactive metals; and purification of organic compounds, particularly those derived from tar and those containing heavy carbon. The laboratory maintains close contact with academic chemistry, the various industries concerned, and other government organizations with common interests.

2766 Report on Investigations Into the Stress-Corrosion Cracking in Welded Gas Mains. Institution of Gas Engineers (London), Communication 398, 1951, 31 pages. (TP700 In8c.)

Studies on the above showed that the cracks are intercrystalline and typical of other examples of stress-corrosion cracking, that they are associated with the welds, that cracking invariably starts from the inside of a main, and that the cracks are frequently associated with irregularities in the weld bead. A hot nitrate-solution test seemed to be satisfactory for determining relative susceptibility of steels to this form of cracking. Micrographs.

See also:

2431 (Gray iron for cylinder sleeves and liners)
2435 (corrosion-resistant lead bronze)
2492 (corrosion prevention by hermetic sealing)
2540 (corrosion protection by sprayed metal)
2560 (corrosion resistance of chromated Al)
2565 (surface treatments to prevent corrosion in naval aircraft)
2573 (potential corrosion-resistance applications)
2590 (effect of Ti on corrosion-resistance of steel)
2679 (oxidation of Cu, Ag, and Al)
2685 (corrosion of steels from steam and combustion atmospheres)
2699 (corrosion of steam pipe)
2717 (scaling of heat-resistant alloys)
2722 (corrosion in gas and steam turbines)
2729 (corrosion of spot-welded Al alloys)
2749 (rustproofing military equipment)
2958 (electrolytic corrosion of Al)
2978 (atmospheric corrosion of Al alloys)
2979 (corrosion resistance of Cu-Pb bearings)
3083a (corrosion of porcelain-enameled steel)
3085 (oxidation of TiC-base cermets)
3087 (oxidation resistance of boron carbide cermets)
3125 (rust-inhibitive properties of greases)
3129 (tests on tube stability vs. corrosion show that 1000-mile oil change is a must)
3167 (corrosion of pile foundations)

15. ANALYSIS—CHEMICAL AND PHYSICAL

2767* Radioactive Tracer-Paper Chromatography Techniques. F. P. W. Winteringham, A. Harrison, and R. G. Bridges. *Analyst*, v. 77, Jan. 1952, p. 19-28.

Uses and potentialities of combined radiochemical and paper-chromatography techniques. The principle of the methods is to associate one or more radioactive isotopes with one or more substances separated on a paper chromatogram. The labelled substances can then be located and estimated by scanning the paper radiometrically. A simple device for doing this automatically and its use in quantitative work.

2768* The Micro-Gravimetric Determination of Palladium With 1:10-Phenanthroline and the Separation of Palladium From Platinum. D. E. Ryan. *Analyst*, v. 77, Jan. 1952, p. 46-48.

Investigation on above shows that Pd can be determined microgravimetrically with 1,10-phenanthroline, that the extreme stability of the complex allows Pd to be separated from Pt without destroying the first precipitate, and that the dinitrate compound is hydrolyzed, in aqueous solution, to give 3 ions.

2769* An Apparatus for the Wet Combustion of Organic Compounds for C-14 Assay. (In English.) Bengt Borgström. *Acta Chemica Scandinavica*, v. 5, nos. 7-8, 1951, p. 1187-1189.

Described and diagrammed.

2770* The Estimation of Boron in Boronised Metals. G. H. Bush and D. G. Higgs. *Analyst*, v. 76, Dec. 1951, p. 683-691; disc., p. 691.

Modification of Tschischewski's method to the estimation of boron in Fe, Ni, Co, and Cu is described, in which these metals are removed by mercury-cathode electrolysis. In addition, a rapid method for the estimation of B in Mo is described in which the metal is separated as the sulfide. 10 ref.

2771* The Polarographic Determination of Aluminium, Zinc, and Tin in Water. H. W. Hodgson and J. H. Glover. *Analyst*, v. 76, Dec. 1951, p. 706-710.

In the above, the factors studied, which influence the reduction wave of aluminum, are pH, composition, and concentration of the base solution.

2772* The Determination of Tungsten and Molybdenum in Titanium. H. G. Short. *Analyst*, v. 76, Dec. 1951, p. 710-714.

A colorimetric method was developed for the above. Colored complexes are formed with toluene dithiol, and these are extracted from aqueous solution with amyl acetate for measurement of the color intensity. Molybdenum reacts at low acidity and is extracted first; tungsten is then extracted from strongly acid solution.

2773* Photometric Determination of Small Amounts of Iron in Magnesium and Magnesium Alloys by Thioglycollic Acid. A. Mayer and G. Bradshaw. *Analyst*, v. 76, Dec. 1951, p. 715-723.

The above is based on the formation in ammoniacal solution of the pink ferrous iron-thioglycollic acid complex, the absorption of which is measured on a Spekker absorptiometer. 14 ref.

2774* An Improved Flame Photometer. L. Leyton. *Analyst*, v. 76, Dec. 1951, p. 723-729.

Describes design, construction, and performance of a relatively simple flame photometer possessing a number of new features that have led to definite improvements in the reliability and performance of the instrument. The incorporation of a concentric type of atomizer and a new burner system allows analyses to be made on less than 1 ml. of test solution with a sensitivity of the order of 0.2 ppm. for K and 0.5 ppm. for Ca. Selectivity has been greatly increased by the introduction of interference filters.

2775* The Determination of Small Quantities of Rhodium in the Presence of Lead and Zinc. D. E. Ryan. *Analyst*, v. 76, Dec. 1951, p. 731-732.

Describes colorimetric procedure used in connection with assay work.

2776 Light Absorption Spectrometry. M. G. Mellon. *Analytical Chemistry*, v. 24, Jan. 1952, p. 2-131.

First section consists of 24 articles by different authors on various theoretical or fundamental aspects: "Light Absorption Spectrometry," M. G. Mellon; "Infrared Spectroscopy," R. C. Gore; "Ultraviolet Absorption Spectroscopy," E. J. Rosenbaum; "X-Ray Absorption," H. A. Liebhafsky; "X-Ray Diffraction," H. S. Kaufman and Isidor Fankuchen; "Emission Spectroscopy," W. F. Meggers; "Mass Spectrometry," V. H. Dibeler and J. A. Hipple; "Organic Polarography," Stanley Wawzonek; "Acid-Base Titrations in Nonaqueous Solvents," J. A. Riddick; "Amperometric Titrations," H. A. Laitinen; "Chromatography and Analogous Differential Migration Methods," H. H. Strain and G. W. Murphy; "Distillation," Arthur Rose; "Ion Exchange," Robert Kunin; "Extraction," L. C. Craig; "Organic Microchemistry," P. W. West; "Fluorometric Analysis," C. E. White; "Electroanalysis," S. E. Q. Ashley; "Inorganic Gravimetric Analysis," C. J. Rodden and C. G. Goldbeck; "Volumetric Analytical Methods for Organic Compounds," W. T. Smith, Jr., and R. E. Buckles; "Characterization of Organic Compounds," R. L. Peck and P. H. Gale; "Experimental Statistics," R. J. Hader and W. J. Youden; and "Biochemical Analysis," P. L. Kirk and E. L. Duggan. (To be concluded.)

2777 Automatic Operations in Analytical Chemistry. Gordon D. Patterson, Jr., and M. G. Mellon. *Analytical Chemistry*, v. 24, Jan. 1952, p. 131-143.

Reviews literature of the past year. 287 ref.

2778 Industrial Analytical Research. Robert T. Hall and Wayne A. Kirklin. *Analytical Chemistry*, v. 24, Jan. 1952, p. 149-151.

Operation of an industrial analytical research group at the Experiment Station of Hercules Powder Co. is cited as an example. 11 ref.

2779 Ceric Salts in Volumetric Analysis. Philena Young. *Analytical Chemistry*, v. 24, Jan. 1952, p. 152-162.
A review. 164 ref.

2780 Ultraviolet Spectrophotometric Determination of Columbium. George Telep and D. F. Boltz. *Analytical Chemistry*, v. 24, Jan. 1952, p. 163-165.

2781 Spectrophotometric Determination of Rhodium With Hypochlorite. Gilbert H. Ayres and Frederick Young. *Analytical Chemistry*, v. 24, Jan. 1952, p. 165-168.

Pd, Pt, Au, Fe, Cr, and Ni ions can be tolerated in relatively large amounts, and Ru, Os, Ir, Co, Mn, and Cu in moderate quantities relative to Rh. Salts of Ir and Co catalyze the decomposition of the hypochlorite. Of the common anions, only iodide and iodate interfere. 11 ref.

2782 Determination of Antimony by Radioactivation. J. E. Hudgens, Jr. and P. J. Cali. *Analytical Chemistry*, v. 24, Jan. 1952, p. 171-174.

Slow-neutron activation and radiochemical separations were used to determine very small concentrations of Sb in samples of pure materials. The generalized technique of radioactivation analysis and precautions that must be taken are given. Sensitivities of 1 part in 10^9 are attainable and the determination is capable of excellent accuracy. Methods of calculating the amount of activity formed by neutron irradiation and of checking the radiochemical purity of the isolated radioelement are discussed. 31 ref.

2783 Application of Ion Exchange to Determination of Boron. J. Robert Martin and John R. Hayes. *Analytical Chemistry*, v. 24, Jan. 1952, p. 182-185.

Conventional methods for the above require a rather lengthy separation from interfering elements. In an effort to improve this, an attempt was made to substitute ion exchange for the usual distillation. The method developed employs a cation exchanger to separate B from large amounts of cation-forming elements. The measurement of the B content, accomplished by a modification of the titrimetric procedure in the presence of invert sugar, permits the presence of a moderate amount of such anions as silicate, arsenate, molybdate, and phosphate.

2784 Automatically Increasing Solvent Polarity in Chromatography. Kenneth O. Donaldson, Victor J. Tulane, and Lawrence M. Marshall. *Analytical Chemistry*, v. 24, Jan. 1952, p. 185-187.

Determination of organic acids separated on silica-gel columns is limited in sensitivity by the reduced resolution experienced for the more water-soluble acids. The widespread use of mechanical apparatus for the collection of chromatographic fractions necessitates a procedure that requires no attention once the separation has begun. A simple device permits automatic delivery of a solvent, gradually increasing in polarity. Recovery studies indicate that the method is suitable for quantitative determination of organic acids.

2785 Detection of Chromatographic Zones by Means of High Frequency Oscillators. P. H. Monaghan, P. B. Moseley, T. S. Burkhalter, and O. A. Nance. *Analytical Chemistry*, v. 24, Jan. 1952, p. 193-195.

Describes apparatus and procedure. Preliminary tests indicate that a wide variety of materials may be detected in this manner. Comparison of measurements made with this instrument with those made by routine visual and chemical methods indicated that results compare well within the experimental error of customary methods.

2786 Silicate Analysis. Robert M. Fowler, Wallace M. Haxel, J. Paul Highfill, and R. E. Stevens. *Analytical Chemistry*, v. 24, Jan. 1952, p. 196-197.

Report of round-table discussion held at 119th Meeting, ACS, Boston, Mass., Apr. 1951.

2787 Chemical Analysis by High Frequency Methods. W. J. Blaedel, T. S. Burkhalter, D. G. Flom, George Hare, and F. W. Jensen. *Analytical Chemistry*, v. 24, Jan. 1952, p. 198-199.

Digest of round-table discussion held at 119th Meeting ACS, Cleveland, Ohio, Apr. 1951.

2788 Determination of Nitrogen and Sulfur in Steel. H. F. Beeghly, John J. Furey, W. R. Sayre, John L. Hague, Charles S. Mills, A. C. Parsons, and E. T. Saxer. *Analytical Chemistry*, v. 24, Jan. 1952, p. 199-205.

Report of round-table discussion held at 119th Meeting, ACS, Cleveland, Ohio, Apr. 1951.

2789 Coulometric Titration of Manganese in the Submicrogram Range. W. Donald Cooke, C. N. Reilley, and N. Howell Furman. *Analytical Chemistry*, v. 24, Jan. 1952, p. 205-207.

Solutions of 0.001-0.0005 microgram of Mn per ml. can be titrated with an accuracy of about 5% by the procedure described.

2790 Coulometric Determination of Submicrogram Amounts of Silver. Samuel S. Lord, Jr., R. C. O'Neill, and L. B. Rogers. *Analytical Chemistry*, v. 24, Jan. 1952, p. 209-213.

The method described is capable of detecting and quantitatively estimating quantities of Ag at least 20 times smaller than in the best spot test reported by Feigl. 21 ref.

2791 Capacitor Cell Modification of Chemical Oscillometer. O. A. Nance, T. S. Burkhalter, and P. H. Monaghan. *Analytical Chemistry*, v. 24, Jan. 1952, p. 214-216.

An attempt was made to apply the heterodyne type of chemical oscillometer developed by West, Burkhalter, and Broussard to industrial analysis of systems of nonelectrolytes. This led to an increased demand for additional sensitivity and suggested desirability of a smaller sample size. Describes instrument developed. Typical data are tabulated and charted.

2792 Estimation of Thorium by Selenious Acid. G. S. Deshmukh and L. K. Swamy. *Analytical Chemistry*, v. 24, Jan. 1952, p. 218.

Reports a simple iodometric method for the above.

2793 Errors in Volumetric Analysis Arising From Absorption. H. M. Hershenson and L. B. Rogers. *Analytical Chemistry*, v. 24, Jan. 1952, p. 219-220.

Presents results of a study of the magnitude of the losses to be expected from adsorption in pipeting very dilute solutions of silver perchlorate in 0.1 N $HClO_4$.

2794 Boric Sinter Method for Determination of Sodium Oxide in Alumina. A. K. Archibald and M. E. McLeod. *Analytical Chemistry*, v. 24, Jan. 1952, p. 222.

Describes improved procedure of high accuracy and much greater rapidity than the classical J. Lawrence Smith method.

15. *Analysis—Chemical and Physical*

2795* Infrared Spectroscopy as an Aid to Analysis. (In German.) W. Lüttke. *Angewandte Chemie*, v. 63, Sept. 21, 1951, p. 402-411.

Describes and illustrates design of an infrared spectroscope and its theoretical principles. Presents several examples to demonstrate its utility in qualitative and quantitative analysis. Diagrams and graphs are presented. 84 ref.

2796* Ring Paper Chromatography According to the Drop Method. Part I. (In German.) G. Zimmermann and K. Nehring. *Angewandte Chemie*, v. 63, Dec. 21, 1951, p. 556.

Brief illustrated description of procedure shows that the method has several very significant advantages. A drop of solution is placed in the center of a piece of filter paper. On spreading towards the outer edge and evaporation of the liquid, concentric rings representing the different constituents are formed.

2797* Electrolytic-Potentiometric Microdetermination of Acids and Alkalies, and of Sulfur and Carbon. (In German.) W. Oelsen and G. Graue. *Angewandte Chemie*, v. 64, Jan. 7, 1952, p. 24-28.

Describes and diagrams apparatus and procedure; typical data are tabulated and charted. 11 ref.

2798* Determining the Mineral Content in Bituminous Coal. (In German.) Fritz Schuster. *Brennstoff-Chemie*, v. 32, Dec. 19, 1951, p. 366-368.

Shows that the residual ash from burned coal is not equivalent to the true ash content of the coal because of the chemical effect of high temperatures. Holthaus' modification of Thiessen's method of determining the mineral content of coal is described. Data are tabulated.

2799 Organic Reagents in Inorganic Analysis; A Short Review of Recent Developments. William I. Stephen. *Chemical Age*, v. 66, Jan. 12, 1952, p. 47-52.

Surveys the above. Many organic materials have the property of forming complexes with inorganic ions and thus can provide the means for their qualitative or quantitative analyses. 36 ref.

2800 Trends in Analytical Procedure. J. R. Majer. *Chemical Age*, v. 66, Jan. 12, 1952, p. 61-68.

Surveys the above.

2801 New Methods in Electrometric Analysis. *Chemical Age*, v. 66, Jan. 19, 1952, p. 123-127.

Surveys the above as discussed at a recent meeting of the Midlands Analytical Methods Discussion Group held in Birmingham, England.

2802 Copper-Base Non-Ferrous Ingots. W. G. Mochrie. *Foundry Trade Journal*, v. 92, Jan. 31, 1952, p. 121-124.

Discusses the classification of various types of the above. Presents a chart of possibilities of mistaken identity in normal sorting techniques for Cu-base alloys, applied in connection with scrap recovery.

2803* Contributions to the Simultaneous Analysis of Different Phosphates. III. Supplement to the Article on Simultaneous Analysis of Pyrophosphate and High-Polymer Metaphosphate. (In German.) W. Dewald and H. Schmidt. *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no. 4, 1951, p. 245-248.

Discussion on above includes tabular data.

2804 Rapid Analysis Determines Cerium in Steel. Charles Morris Johnson. *Iron Age*, v. 169, Jan. 17, 1952, p. 94-96.

A rapid method of determining the Ce-group rare-earth content in steel, where they are used as additive agents, involves precipitation with dry sodium peroxide powder from the acid sulfate solution. La and Nd are precipitated with the Ce.

2805 The Determination of the Cement Content of Soil-Cement Mixtures. I. A Laboratory Method. II. Rapid Field Methods. K. E. Clare and P. T. Sherwood. *Journal of Applied Chemistry*, v. 1, Dec. 1951, p. 551-560.

2806 Substituted Benzidines and Related Compounds as Reagents in Analytical Chemistry. Part VIII. 3:3'-Dimethylnaphthidine as Indicator in the Titration of Cadmium, Calcium, and Indium With Ferrocyanide. R. Belcher, A. J. Nutten, and W. I. Stephen. *Journal of the Chemical Society*, Dec. 1951, p. 3444-3447.

2807 Method of Colloid Titration (A New Titration Between Polymer Ions.) Hiroshi Terayama. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 243-253.

Presents a general discussion on the above. All materials which combine stoichiometrically and irreversibly with standard polymer ions, may be analyzed by the above method. 53 ref.

2808* Internal Standard Flame Photometry. E. G. Walsh. *Journal of Scientific Instruments*, v. 29, Jan. 1952, p. 23-25.

A color wedge photometer was used to study some aspects of flame photometry as applied to chemical analysis. It is shown that convenient calibration curves may be obtained with this method. Studies were also made of the effect of foreign substances and of optimum operating conditions of the flame.

2809* Analysis of Charges Containing Pyrolusite and Pyritic Cinders. (In Russian.) V. I. Panasiuk. *Legkaya Promyshlennost*, v. 11, Apr. 1951, p. 38-39.

Methods of analysis for glass-tank batches are described and discussed.

2810* Determination of Sulfate in Chromium Baths Using Radiobarium. Stanley L. Eisler. *Metal Finishing*, v. 50, Jan. 1952, p. 71-74.

A procedure employing radiobarium in the precipitating agent used for determining sulfate concentration is described. The concentration was found to be inversely proportional to the counting rate of the filtrate containing the excess radiobarium. Test results compared with those of the conventional gravimetric procedure, indicated better results could be obtained by using the radiometric method.

2811* The Perchloric-Formic Acid Method for Gold. Louis Silverman. *Metal Finishing*, v. 50, Feb. 1952, p. 71-73.

Tells how above procedure may be used for determination of Au in Au-Cu alloys and for potassium gold cyanide. Interfering elements are listed.

2812 A Further Note on the Reproducibility of Analytical Results. E. C. Mills and S. E. Herman. *Metallurgia*, v. 45, Jan. 1952, p. 47-48.

Comparison is made between variations occurring in research analysis and those found in routine analysis.

2813 Investigations on Colorimetric Methods of Metallurgical Analysis. Part IV. Estimation of Silicon in Steel Using the Dubosecq Type of Colorimeter. G. V. L. N. Murty. *Metallurgia*, v. 45, Jan. 1952, p. 53-54.

2814* Quantitative Determination of Molybdenum. (In German.) E. Gagliardi and W. Pilz. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, Dec. 15, 1951, p. 1012-1021.

The methods of Kassler, Reissans, Doring, and Randall were re-examined and found to be unsuitable under certain conditions. A manganometric method is described and low-temperature reduction is studied. Data are tabulated. 17 ref.

2815* CO_2 Ion-Chamber Techniques for Radiocarbon Measurement. Gordon L. Brownell and Helen S. Lockhart. *Nucleonics*, v. 10, Feb. 1952, p. 26-32.

One of the most sensitive methods for C^{14} detection and measurement is use of an ionization chamber filled with radioactive CO_2. A basic review of theory and techniques is given. 13 ref.

2816 Metallurgical Microspectroscopy Using Microdrills. Ford R. Bryan. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 1061.

An improved microspectrographic method of identifying metallic constituents in metallurgical specimens has been devised. The principle consists of drilling out the minute portion to be analyzed, flowing a material such as collodion over the resulting chips, and transferring the collodion together with chips to a pure carbon electrode for spectrographic analysis.

2817 How to Identify Chrome Steels Quickly. H. M. Randall. *Petroleum Processing*, v. 7, Jan. 1952, p. 60-61.

Describes a simple and rapid field test for identifying corrosion-

resistant alloy steels according to Cr content recently developed by Engineering Inspection Department of Standard Oil Co. (Ind.) at its Whiting Refinery.

2818 Fluorescence Analysis. XIV. An Application of Chromatography With Filter Paper. (In English.) Yachiyo Kakita and Hidehiro Goto. *Science Reports of the Research Institutes Tôhoku University*, ser. A, v. 2, Dec. 1950, p. 837-842.

Oxine, Chochineal and Rhodamine B were used as developing reagents and absorptions were made in neutral, alkaline or ammonia, or sodium tartarate solutions. Chromatograms of Pb, Cu, Cd, Zn, Ni, Co, Mn, and Fe are shown photographically.

2819 Apparatus for Vacuum X-Ray Fluorescence Analysis of Light Elements. L. S. Birks. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 891-894.

Gives operation, results, and application of the above apparatus, applicable to elements from Mg to Ti.

2820* The Application of Rubber in the Quantitative Determination of Ozone. C. E. Bradley and A. J. Haagen-Smit. *Rubber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 750-755.

A convenient rubber cracking test for ozone is described. This method serves not only as a rapid, positive means of identifying ozone in complex gas mixtures but also gives a close approximation to the quantity present. Application of the method in determining ozone in heavy smog atmosphere is shown.

2821* Process Values of Analytical Methods. (In German.) Alwin Schleicher. *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no. 3, 1951, p. 192-198.

Shows that Ohm's law and the values of internal resistance, energy, and output, which can be derived from Ohm's law, can be expanded by the values of capacitance and self-induction. Neutralization titration, polarography, and redox titrations are cited as examples. Data are graphed. 10 ref.

Miscellaneous Publications

2822 Chemical Procedures Used in Bombardment Work at Berkeley. W. Wayne Meinke. U.S. Atomic Energy Commission, AECD-3084, Mar. 15, 1951, 37 pages. (UF767 Un3m.)

Procedures developed by various investigators are presented in detail.

2823 Determination of Manganese in Iron and Steel With Red Lead. M. V. Kharitonova. Henry Brutcher, Translation 2716, 3 pages. (From *Zavodskaya Laboratoriya*, v. 16, July 1950, p. 876-877.)

Possibility of using red lead instead of lead peroxide in volumetric determination of Mn in ferrous alloys is discussed. Correlation of results of the proposed method with those of persulfate method are given.

2824 Specific Etch Colors of Iron-Silicon Alloys; A New Rapid Method for Identifying High-Percent Iron-Silicon Alloys. E. Fitzer. Henry Brutcher, Translation 2736, 9 pages. From *Werkstoffe und Korrosion*, v. 1, Mar. 1950, p. 103-104.)

Previously abstracted from original.

2825 X-Ray Absorption in Chemical Analysis and Control. Herman A. Liebhafsky. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 997-1014. (Q11 N49a.)

Reviews fundamental information on the above. 28 ref.

2826 The Analytical Specificity of Countercurrent Distribution. J. Delafield Gregory and Lyman C. Craig. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 1015-1030. (Q11 N49a.)

Outlines briefly the actual procedure and some of the simple mathematics which furnish a basis for the above method as an analytical tool. Apparatus and type of results which can be obtained are described. 14 ref.

2827 Goniometric Analysis of Crystals. J. D. H. Donnay. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 1082-1086. (Q11 N49a.)

Describes the above giving some special cases where it is applicable. An example is that of a pseudomorphous crystal, resulting from the alteration or replacement of a preexisting crystal of a different chemical composition, whose external form is preserved. 24 ref.

2828 Quantitative Analysis by Means of Catalytic Hydrogenation Reactions. E. C. Dunlop. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 1087-1092. (Q11 N49a.)

Describes the above. Experimental results on maleic acid, diisobutylene, unsaturated ketones, and styrene are tabulated.

2829 Analysis of Mixtures Based on Rates of Reaction. T. S. Lee and T. M. Kolthoff. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 1093-1107. (Q11 N49a.)

Describes method useful chiefly for analysis of mixtures of two organic compounds that contain the same functional group. In general, the procedure requires two titrations for analysis of each mixture. Experimental results of application of the method to analyses of several types of mixtures of organic compounds are discussed. 14 ref.

2830 Automatic Paper Chromatography. Ralph H. Muller and Doris L. Clegg. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 1108-1118. (Q11 N49a.)

Describes some experimental approaches to the application of physical techniques, including optical, electrical, and dielectric methods to the above. 28 ref.

2831 Sampling and Analysis of Tin Ingots. J. W. Price. Tin Research Institute, Aug. 1951, 5 pages. (Pamphlet File.)

Methods for the above are presented.

Books

2832 X-Ray Identification and Crystal Structures of Clay Minerals. G. W. Brindley, editor. 345 pages. 1951. Taylor and Francis, London. (QE435 B77x.)

Includes 14 chapters by various authors dealing with different aspects of the above.

2833 Inorganic Micro-Analysis. H. V. A. Briscoe and P. F. Holt. 171 pages. 1950. Edward Arnold & Co., London. (QD98 B77i.)

Describes qualitative and quantitative techniques in the above.

2834 Methods of Analysis of Fuels and Oils. J. R. Campbell. 216 pages. 1951. Constable & Co., London. (TP321 C15m.)

Provides a laboratory guide to the principal methods of examination of gaseous, liquid and solid fuels and lubricating oils. It was designed primarily to meet the requirements of students of Applied Chemistry, Metallurgy and Engineering taking courses in Fuel Technology. Comprises essentially a collection of established experimental methods. 28 ref.

2835 Quantitative Organic Microanalysis. Al Steyermark. 389 pages. 1951. The Blakiston Co., New York. (QD117 St49g.)

Presents methods and procedures, with apparatus descriptions, for elemental and group analyses. Chapter references.

2836 Chemical Indicators. O. Tomicek. 258 pages. 1951. Butterworths Scientific Publications, London. (Translated from the Czech.) (QD77 T59ctr.)

Includes a section on acid-alkali indicators which covers both volumetric analysis and also the accurate determination of pH values, while one on redox indicators gives sufficient details for the performance not only of regular oxidation-reduction titrations but also of a number of others, less well known, but said to be extremely useful in general laboratory practice. Includes tables covering all the common indicators as well as those less commonly used.

2837* Tables for Microscopic Identification of Ore Minerals. W. Uytenbogaardt. 242 pages. 1951. Princeton University Press, Princeton, N.J. (TN565 Uy8t.)

Presents tables on those ores which have been described sufficiently to permit microscopic identification. 421 ref.

See also:
2551 (Pb-Sn plating-bath analysis)
2851 ("Aids for the Analyst")
3037 (analysis of peat—Russian book)
3472 (analysis of nitrogenous coating resins)

16. APPARATUS, METHODS, AND STANDARDS

2838 A Precise Recording Ultrasonic Interferometer and Its Application to Dispersion Tests in Liquids. Romard Barthel and A. W. Nolle. *Journal of the Acoustical Society of America*, v. 24, Jan. 1952, p. 8-15.

16. *Apparatus, Methods, and Standards*

The above device is an interferometer of the 2-crystal type in which separation of the crystals is continuously varied. 14 ref.

2839 A Recording Ultrasonic Interferometer and Its Alignment. James L. Stewart and Ellen S. Stewart. *Journal of the Accoustical Society of America*, v. 24, Jan. 1952, p. 22-26.

The 1st part describes a circuit employing r.f. amplification which converts an ultrasonic interferometer into a sensitive self-recording instrument whose records can be simply analyzed to yield a rapid determination of attenuation and reflection coefficients of gases at low pressures. The 2nd part summarizes sources of error in ultrasonic interferometry, their detection, and correction. In the 3rd part, some data on velocity, attenuation, and reflection in He in the region 2-60 Mc./atm. are presented.

2840 A Mechanical Shock Tester for Instruments and Electronic Apparatus. Charles T. Morrow. *Journal of the Accoustical Society of America*, v. 24, Jan. 1952, p. 26-28.

Describes tester of the free-fall type designed to produce high accelerations in the form of square waves. Particular attention is paid to the relation between shocks an equipment is likely to receive in practice and the optimum type of test apparatus.

2841 Graphical Indexing of Powder Patterns of Cubic Substances and the Choice of Radiation for Precision Measurements of Lattice Parameters. M. E. Straumanis. *American Mineralogist*, v. 37, Jan.-Feb. 1952, p. 48-52.

A convenient graphical method is described showing how to find the most suitable x-radiation for precision determination of lattice parameters, and at the same time, allows one to index the powder patterns. It is based on application of the 3-dimensional reciprocal lattice and is very simple, especially in the case of cubic crystals.

2842* A Laboratory Apparatus for Determining the Rate of Extraction of Oil From Oil-Bearing Materials. S. P. Clark and Cecil Wamble. *Journal of the American Oil Chemists' Society*, v. 29, Feb. 1952, p. 56-59.

Describes the apparatus and method. Gives typical experimental results.

2843 On the Automatic Control of Generalized Passive Systems. Kun Li Chien, J. A. Hrones, and J. B. Reswick. *Transactions of the American Society of Mechanical Engineers*, v. 74, Feb. 1952, p. 175-183; disc., p. 183-185.

The dynamic behavior of a multiple-capacity passive system is compared to that of a single-capacity system of appropriate "time constant with a finite time delay." Such a comparison indicates that the latter system reproduces the dynamic behavior of the multiple-capacity system with sufficient accuracy for most engineering purposes. This fact makes it possible to characterize such systems by a single parameter.

2844 Supervisory Instruments for Power-Generating Equipment—Application and Interpretation of Records. E. Y. Stewart and J. H. Reynolds, Jr. *Transactions of the American Society of Mechanical Engineers*, v. 74, Feb. 1952, p. 187-198; disc., p. 198-199.

Equipment is available to record turbine conditions in terms of shell and differential expansion, speed and camshaft position, bearing vibration, and shaft eccentricity. A description of shell and differential-expansion recording equipment is included. Discusses a number of case examples in which mechanical trouble was detected by instruments.

2845 Field Inspection of Boiler Tubes With Ultrasonic Reflectoscope. J. A. Tash. *Transactions of the American Society of Mechanical Engineers*, v. 74, Feb. 1952, p. 201-205; disc., p. 206.

Details are given of the ultrasonic reflectoscope and its use in detecting defective small-diameter tubing.

2846 A New Method for Determining the Static Temperature of High-Velocity Gas Streams. J. A. Clark and W. M. Rohsenow. *Transactions of the American Society of Mechanical Engineers*, v. 74, Feb. 1952, p. 219-227; disc., p. 227-228.

The general problem of measuring the static temperature of gases flowing at high and low temperatures and at low and high velocities is reviewed. Thermodynamic methods are discussed and a new method is presented with experimental results.

2847 An Instantaneous and Continuous Sodium-Line Reversal Pyrometer. M. M. El Wakil, P. S. Myers, and O. A. Uyehara. *Transactions of the American Society of Mechanical Engineers*, v. 74, Feb. 1952, p. 255-264; disc., p. 265-257.

The theory, development, and calibration of an electro-optical sodium-line reversal pyrometer are given. This pyrometer instantaneously and continuously determines and indicates the black-body temperature of a non-luminous flame made luminous at the Na wave length by addition of Na. Typical data obtained on a spark-ignition engine are presented and compared with those of previous investigators. 25 ref.

2848 Experimental Statistics. R. J. Hader and W. J. Youden. *Analytical Chemistry*, v. 24, Jan. 1952, p. 120-124.

Reviews literature on the above published since Jan. 1949. 154 ref.

2849 A Focusing Cell Refractometer. L. E. Ashman, W. S. Schwartz, and H. E. Jones. *Analytical Chemistry*, v. 24, Jan. 1952, p. 191-193.

Above was developed as a part of a general program to improve the efficiency of the manufacture of synthetic rubbers. It has particular application to the monitoring of hydrocarbon feed streams such as butadiene and styrene and as an index of product quality. Laboratory data indicate general usefulness as a plant-control medium.

2850 Simple Photometric Method for Use With RCA Type EMB Electron Microscope. W. G. Kirchgessner. *Analytical Chemistry*, v. 24, Jan. 1952, p. 224.

The following advantages are claimed for the device described: consistent uniformity of negatives, resulting in elimination of repeat exposures; and flexibility, in that the unit is easily assembled from readily available parts and may be quickly detached for use in other laboratory problems.

2851 Aids for the Analyst. *Analytical Chemistry*, v. 24, Jan. 1952, p. 229-230.

"Switching System for Beckman Absorption-Flame Spectrophotometer," A. L. Dunn, F. L. Humoller, and A. R. McIntyre; "Improved Pycnometer for Powders, Precipitates, and Synthetic Resins," V. F. Downing and F. R. Parker; "A Gas Trap of Large Capacity," Dean R. Rexford.

2852* The Adhesion of Powders and Its Use in the Determination of Particle Sizes. (In German.) E. Cremer, F. Conrad, and Th. Kraus. *Angewandte Chemie*, v. 64, Jan. 7, 1952, p. 10-11.

Presents results of investigation of the above. Magnesite, dolomite, Fe powder, and Mo powder were tested. Base materials were glass, magnesite, Ni, or Mo. Useful relationships applicable in particle-size determination were discovered. Data are charted and tabulated.

2853* Instruments for Measuring Internal Stresses in Transparent Bodies. (In German.) Otto Macek. *Archiv für technisches Messen*, Dec. 1951, p. T133-T134. (4p.)

Describes principles and design of the above. Diagrams and photographs.

2854* Process and Instruments of Measuring Extremely Small Gas Pressures. II. Compression and Heat-Conducting Manometers. (In German.) Helmut Schwarz. *Archiv für technisches Messen*, Jan. 1952, p. 7-10.

Above are described and diagrammed. Bibliography will be published in a later issue.

2855* Measuring Frequency According to the Condenser-Charge Method. II. (In German.) Hans Weidemann. *Archiv für technisches Messen*, Jan. 1952, p. 11-14.

Discusses limits of the above, frequency "jumps," and indirect measuring circuits such as multivibrators, thyratrons, and transitrons. Includes numerous circuit diagrams and charts. 13 ref.

2856* Scale-Covering and Frequency Errors in Equipment With Blocking-Layer Rectifiers. (In German.) J. Hájek. *Archiv für technisches Messen*, Jan. 1952, p. 19-22.

Mathematical discussion includes diagram and references.

2857 Progress on Many Fronts in ASTM Research and Standardization Work. R. E. Hess and R. J. Painter. *ASTM Bulletin*, Jan. 1952, p. 5-14.

Outlines developments of past year in miscellaneous standards and specifications for metallic and nonmetallic materials.

2858 Cheaper Sterile Drugs. *Chemical Engineering*, v. 59, Jan. 1952, p. 228.

Describes how fission products, the by-products of plutonium, can sterilize heat-sensitive drugs and do it cheaper than present methods.

2859 Freeze Drying With Radiant Energy. W. H. Zamzow. *Chemical Engineering Progress* (Engineering Section), v. 48, Jan. 1952, p. 21-32; disc., p. 32.

Presents a study on the above. Frozen material retained on a supporting medium transparent to infrared radiation was dried with radiant energy emitted from electrically heated wires. Drying time curves were obtained for various conditions of cake thickness, initial moisture content, and energy concentration. 19 ref.

2860* Directly Recording pH Measuring Instrument With Shock-Proof Glass Electrode and Low "Alkali Error" for Solutions With Temperatures Up to 100°C. (In German.) Arthur Kuntze. *Chemie-Ingenieur-Technik*, v. 23, Nov. 14, 1951, p. 517-519.

Above is briefly described and illustrated. Data are charted.

2861* Laboratory and Plant Results With Hydrocyclones. (In German.) G. Krijgsman. *Chemie-Ingenieur-Technik*, v. 23, Nov. 28, 1951, p. 540-542.

Above includes discussion on use of hydrocyclonic separators in the starch industry, for classifying highly viscous and non-Newtonian liquids, and as washing devices in ore-beneficiation plants. Diagrams, graphs, and tables are presented.

2862* Liquids and Vapors as Heat Exchange Media in the Temperature Range 200-400°C. (In German.) Hermann Schulze. *Chemie-Ingenieur-Technik*, v. 23, Dec. 21, 1951, p. 565-569.

Discusses advantages and disadvantages of water, molten salts, molten metals, and organic liquids as heat exchangers. Data are tabulated.

2863* Simple Device for Maintaining Constant Flow Velocity by Adsorption Columns. (In German.) Walther Vogt. *Chemie-Ingenieur-Technik*, v. 23, Dec. 21, 1951, p. 580-581.

Describes an arrangement in which automatic pressure adjustment results in uniform flow velocity. Includes diagrams and graphs.

2864* Concerning the First Images Obtained With a Proton Microscope. (In French.) Paul Chanson and Claude Magnan. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Dec. 3, 1951, p. 1436-1438.

Describes and illustrates the proton microscope and some of the first results obtained by its use. Includes photographs. 11 ref.

2865* On the Background of Pulse-Coded Computors. Parts 1 and 2. T. J. Rey. *Electronic Engineering*, v. 24, Jan. 1952, p. 28-32; Feb. 1952, p. 66-69.

Calculating aids are shown to culminate in the computers dubbed "electronic brains," although they possess a mechanical ancestor. A short description of organization explains why they are useful in spite of the work they impose on humans. Subsequent sections deal with on-off signals and physical embodiments of mathematical concepts which are necessary for communication with and within the machine. Mathematical logic and its connections with ordinary arithmetic are introduced. Finally, "digital" and "analog" systems are compared. 21 ref.

2866* An Electronic Servo Simulator for Unstable and Open Loop Systems. N. T. van der Walt. *Electronic Engineering*, v. 24, Feb. 1952, p. 52-57.

Describes an electronic instrument for simulating differential equations representing either stable or unstable servomechanisms. A repetitive step input is applied to the simulator and the response is viewed directly on a cathode-ray oscilloscope provided with a synchronous time-base. The simulator is made up of a number of "units" in cascade, each of which consists of a feedback amplifier and represents a first-order transfer junction.

2867* An Industrial Servo-Mechanism. P. H. Briggs. *Electronic Engineering*, v. 24, Feb. 1952, p. 58-62.

Gives the history of the development of one particular servomechanism designed as the result of a specific industrial requirement, in this case, the textile industry.

2868* Piezo-Electric Crystal Constants. W. R. Hinton. *Electronic Engineering*, v. 24, Feb. 1952, p. 76-77.

The construction of a balanced measuring transformer is described in detail together with the technique of its use to measure effective series resistance of crystals. A method of measuring effective series reactance, and hence its "Q" value, by allowing the crystal to control the frequency of an oscillator, is also given.

2869* An Electronic Multiplier. M. J. Semerville. *Electronic Engineering*, v. 24, Feb. 1952, p. 78-80.

The multiplier described was designed for use in an analog-computor, for which purpose no time lag in multiplying can be tolerated. The aim was therefore to make time lag negligible, rather than to obtain very high accuracy. Numerous diagrams.

2870* A Diaphragm-Type Micromanometer. Michael Lorant. *Electronic Engineering*, v. 24, Feb. 1952, p. 80-81.

The above instrument permits measurements that are totally independent of the type of gas or vapor being measured. Illustrations.

2871* Mechanical Harmonic Analyser and Some Applications to Servo Systems. J. G. Henderson. *Engineering*, v. 173, Jan. 11, 1952, p. 52-56; Jan. 18, 1952, p. 68-70.

A novel form of harmonic analyzer, which uses a resolver plate to evaluate the integrals that determine the coefficients of the Fourier series for a given curve, is described. Illustrations and diagrams.

2872* The Bifilar Pendulum for the Damping of Torsional Vibrations. L. Devaux. *Engineers' Digest*, v. 12, Dec. 1951, p. 403-406. (Translated and condensed from *Revue Universelle des Mines*. ser. 9, v. 7, Aug. 1951, p. 237-250.)

Previously abstracted from original.

2873 A Theory of Multidimensional Servo Systems. Michael Golomb, and Eugene Usdin. *Journal of the Franklin Institute*, v. 253, Jan. 1952, p. 29-57.

A mathematical treatment.

2874 Radiographic Techniques for Examining Steel Castings. *Foundry Trade Journal*, v. 91, Dec. 27, 1951, p. 731-733.

Describes an investigation carried out by members of the non-destructive testing sub-committee of BISRA into the relative merits of a number of radiographic techniques suitable for use on steel castings. Data are tabulated.

2875* Damping Oscillograph Vibrations With Liquids. (In German.) W. Härtel. *Frequenz*, v. 5, Sept. 1951, p. 233-245.

Shows that the inadequacy of natural electromagnetic damping for suppressing the motions of high-frequency oscillograph vibrators can be corrected by artificial damping with viscous liquids. Principles of proposed method are described and diagrammatically illustrated. Data are charted and tabulated.

2876 Fluid Bed Flowmeter. C. F. Gerald. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 233-235.

The flowmeter described is simple in construction, gives a continuous indication of rate, is adaptable to measurement of corrosive liquids, has small holdup and no stagnant pockets, and is very sensitive without large pressure drop. It has been used to measure flows as small as 10 ml. per hr. and can measure flows in the range of commercial importance.

2877 Evaluation of Food Irradiation Procedures; Quantitative Chemical Measurements Utilizing High Energy Cathode Rays. Samuel A. Goldblith, Bernard E. Proctor, and Olivia A. Hammerle. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 310-314.

Describes qualitative and quantitative findings relating to the effects of high-energy electrons on aqueous and nonaqueous solutions of methylene blue, the use of agar gels containing resazurin as an index of the penetration of high-energy electrons, and application of these data to field-distribution studies.

16. *Apparatus, Methods, and Standards*

Cathode rays ranging in voltage from 2.0 to 16 million electron volts were used as the source of radiation. 10 ref.

2878 Temperature Gradients in Turbulent Gas Streams; Methods and Apparatus for Flow Between Parallel Plates. Temperature and Velocity Distributions in Uniform Flow Between Parallel Plates. F. Page, Jr., W. H. Corcoran, W. G. Schlinger, and B. H. Sage. **Point Values of Eddy Conductivity and Viscosity in Uniform Flow Between Parallel Plates.** F. Page, Jr., W. G. Schlinger, D. K. Breaux and B. H. Sage. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 410-430.

Describes the above. Several measurements pertinent to establishment of the eddy viscosity and eddy conductivity were determined. Graphs and tables. 69 ref.

2879* Instruments to Fit the Job. Warren Walker, Jr., *Industry and Power*, v. 62, Feb. 1952, p. 71-74.

Gives information on the most common temperature-measurement instruments, their applications, advantages, and principal differences.

2880* Fluorescent Tracer Agents. J. A. Radley. *International Chemical Engineering & Process Industries*, v. 33, Jan. 1952, p. 30-31.

Discusses various uses of the above. Includes application of this technique to detect tiny cracks and pinholes in certain sheet materials and to determine whether a batch of material has been properly mixed.

2881 Optimalizing System for Process Control. Y. T. Li. *Instruments*, v. 25, Jan. 1952, p. 72-77.

Discusses types of process-control systems. Designs are given for "optimalizing controllers" in which a forcing function, or test variation is imposed on the process controller, and by using the resulting output variation, the controller is adjusted automatically. This technique may provide the answer to the supreme problem of industrial control—how to match the controller to the characteristics of the process. Data on performance are given in detail. (To be continued.)

2882 Operating Experiences With Multi-Element Control. Howard L. Andersen. *Instruments*, v. 25, Jan. 1952, p. 101-102.

Tells how multi-element controllers measure and combine several interrelated variables to control a process function within close limits, over wide load changes, and with high stability.

2883 Fundamentals of Orifice Measurement. F. M. Partridge. *Instruments*, v. 25, Feb. 1952, p. 207-209.

Briefly surveys the above. Includes diagrams.

2884 Low-Cost Atomic Furnace; Important Research Tool. *Iron Age*, v. 169, Jan. 24, 1952, p. 75-77.

Describes and discusses the above designed by North American Aviation. Uranium is used as "fuel." It is said that industry and research organizations will be able to afford low-cost, low-power atomic furnaces similar to this one. Production of "tagged atoms" will spur research. Design prevents reactor from destroying itself. Neutron production can be controlled by operator.

2885 Stainless Steel Product Standards. George N. Malcolm. *Iron and Steel Engineer*, v. 29, Jan. 1952, p. 70-72.

Discusses the above, giving a step by step review of mill processing to attain a specific finish. Covers hot and cold rolling of sheet, plate, or strip; annealing; pickling; and mechanical polishing.

2886 On the Reliability of Geiger-Counter Response at Moderately High Rates. L. G. Parratt and C. F. Hempstead. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1502-1503.

Surveys factors which are a source of inconstancy of Geiger-counter response. Data are graphed.

2887 The Transmission of Hydrogen Through Metals. H. B. Wahlin. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1503.

Outlines experiments on Pd, Ni, Cb, Ta, and Mo. Describes substitution of electrolytic method for the heated Pd tube as a source of high-pressure, pure hydrogen in the laboratory.

2888 The Use of Light Scattering for Determining Particle Size and Molecular Weight and Shape. Max Bender. *Journal of Chemical Education*, v. 29, Jan. 1952, p. 15-23.

Explains fundamental principles of the above.

2889* Study of a Method for Measuring the Thickness of Non-Magnetic Layers on Steel. (In Japanese.) Osamu Ito. *Journal of Mechanical Laboratory*, v. 5, Aug. 1951, p. 153-156.

The method described consists of measuring the force required to separate a magnet energized by a.c. from the surface of a coated steel article, by use of a self-compensating magnetic balance. By this method, thickness of nonmagnetic coatings and platings on a steel base can be easily measured without destruction. Graphs and tables.

2890* Demountable X-Ray Tube for Radiocrystallographic Studies. (In French.) Ch. Legrand. *Journal des Recherches du Centre National de la Recherche Scientifique*, no. 16, 1951, p. 31-34.

Describes a new tube which makes possible easy and exact adjustments as well as fine focusing. Includes diagrams and photograph.

2891 A New Comparator of High Precision for the Measurement of Line Standards of Length. J. S. Clark, L. O. C. Johnson, and V. W. Stanley. *Journal of Scientific Instruments*, v. 28, Dec. 1951, p. 357-364.

Describes and diagrams above apparatus. Typical results indicate that line standards of length can be measured with an accuracy approaching one part in 10,000,000 and that, over a range of about 30°C., mean coefficients of expansion of the order of 10^{-5} per 1°C. can be determined with an accuracy of about 0.1%.

2892 An Interferential Lens Centering Lathe and Edging Machine. G. A. Harle, *Journal of Scientific Instruments*, v. 28, Dec. 1951, p. 365-368.

Gives principles of an interference method for the centering of optical systems with 1 and 2 surfaces. Describes design and performance of an interferential transmission centering lathe and edging machine developed for use in the construction and examination of symmetrical and asymmetrical lenses, together with a reflection type apparatus for use with mirrors and lenses of special quality.

2893 An Apparatus Delivering Water at Constant Temperature. E. R. Dymott and J. C. Evans. *Journal of Scientific Instruments*, v. 28, Dec. 1951, p. 369-370.

Describes equipment which maintains the temperature of flowing water constant to within ± 0.01°C.

2894 The Measurement of Refractive Index Gradients in Small Glass Specimens. J. W. Gates. *Journal of Scientific Instruments*, v. 28, Dec. 1951, p. 370-372.

The refractive index gradient from point to point along the length of a specimen about 20x5x1 mm. was determined from the relative deviations of incident parallel pencils of light. The effect of imperfections in the boundary layers is reduced by immersing the specimen in a liquid of suitable refractive index.

2895* A Two Fluxmeter Method of Measuring Ferromagnetic Hysteresis Loss. H. Aspden. *Journal of Scientific Instruments*, v. 29, Jan. 1952, p. 5-7.

Describes a method for measuring hysteresis loss without recourse to complicated devices and special instruments. It is as accurate as any other method and is simple to operate.

2896* A New Type of α-Particle Bench Monitor. R. D. Connor. *Journal of Scientific Instruments*, v. 29, Jan. 1952, p. 12-13.

Describes development of a Rosenblum-type spark counter for the above. Properties of this instrument are compared with those of previously reported air counters.

2897* A Servo-Mechanical Apparatus for the Investigation of the Properties of Visco-Elastic Materials. L. J. Hastewell and F. J. U. Ritson. *Journal of Scientific Instruments*, v. 29, Jan. 1952, p. 20-23.

An apparatus is described which is suitable for investigation of the mechanical properties of gels and sols having relaxation times above 1 sec. The material under test occupies the space between two concentric cylinders and is subjected to constant stress by means of a servomechanism designed to follow smoothly at slow angular speeds.

2898 Strain Gages Aid Positioning of Jet-Engine Blades. E. L. Watelet. *Machine Design*, v. 24, Jan. 1952, p. 100-104.

Describes new machine which accurately positions jet blades, through a novel strain-gage system, and drills 3 center holes at the rate of 120 per hour.

2899 Stroboscope Tachometer. Alvin B. Kaufman. *Machine Design*, v. 24, Feb. 1952, p. 157-160.

Discusses factors entering into the design of a fixed-frequency type stroboscopic test unit for accurately checking tachometer calibration over a wide range of speeds.

2900* Important Developments in Instrumentation. Rolt Hammond. *Machinery Lloyd* (Overseas Edition), v. 24, Jan. 9, 1952, p. 77, 79, 81, 83-84.

Surveys various types of measuring, controlling and transmitting instruments. Diagrams.

2901* Physical and Metallurgical Viewpoints in Ultrasonic Testing of Materials. (In German.) H. J. Seemann. *Metall*, v. 5, Dec. 1951, p. 531-537.

Describes the above on the basis of the literature, particularly the problem of scattering and absorption in solid bodies and its connection with the structure of the test pieces. Data are tabulated and charted. 25 ref.

2902 Sizing Powder Particles. *Metal Industry*, v. 80, Jan. 4, 1952, p. 9-10.

Describes the Photosedimentometer designed to put sub-sieve analysis on a routine basis. It is a particle-size comparator for maintaining consistency of powdered materials.

2903 Speedier Powder Quality Control Made Possible; New Photoelectric Equipment Described. *Metallurgia*, v. 45, Jan. 1952, p. 49-51.

One of the most important characteristics affecting the quality of a powder is its particle-size distribution. The instrument described was designed with the object of putting sub-sieve analysis on a practical routine basis.

2904 Flow-Through Electrode Tubes Suitable for Use in Routine Polarographic Analysis. F. C. Spurr. *Metallurgia*, v. 45, Jan. 1952, p. 52-53.

Describes the above method.

2905* X-Ray Examination of Two Gold Plates From Archaelogical Excavations. (In French.) A. R. Weill. *Metallurgia Italiana*, v. 43, Dec. 1951, p. 507-511.

Describes a nondestructive investigation of plates found at Kertsch and preserved in the Louvre. Measurement of density was followed by X-ray diffraction study of crystal structure. Composition and method of fabrication were deduced from the results.

2906* Radioisotope Production in the United States. Paul C. Aebersold and A. F. Rupp. *Nucleonics*, v. 10, Jan. 1952, p. 24-27.

Involved in the more than 20,000 shipments of radioisotopes by the AEC are problems of reactor operation, chemical processing, and handling of active materials. Presents summary of the problems and their solution.

2907* Lead Shot for Gamma-Ray Shielding. *Nucleonics*, v. 10, Jan. 1952, p. 27. (From report of A. Nightingale, *British Journal of Radiology*, v. 24, 1951, p. 568.)

It has been found that cavity walls made of sheet iron and filled with 0.1-in. lead shot may be used to replace solid lead walls used to protect personnel against gamma radiation. The lead-shot walls are not suitable for shielding photographic materials.

2908* A Simple Low-Drift Electrometer. F. M. Glass. *Nucleonics*, v. 10, Feb. 1952, p. 36-39.

Describes an a.c. model that is compact, moderately sensitive, rugged, and inexpensive. Diagrams.

2909* "Air Equivalence" of Scintillation Materials. William B. Ittner, III, and Michel Ter-Pogossian. *Nucleonics*, v. 10, Feb. 1952, p. 48-53.

The above is discussed from the standpoint of energy absorption and crystal response. Methods of simulating air equivalence are presented. 11 ref.

2910* Tests on Scintillation G-M Tubes. V. M. Daggs, W. H. Parr, and A. T. Krebs. *Nucleonics*, v. 10, Jan. 1952, p. 54-55.

Preliminary measurements show that the response of commercial scintillation G-M tubes varies with the position of the source of radiation. 10 ref.

2911* Molded Multi-Crystalline Stilbene for Scintillation Counting. Earle C. Farmer and Irving A. Berstein. *Nucleonics*, v. 10, Feb. 1952, p. 54-56.

Above material combines some advantages of both crystalline and plastic phosphors. Relative advantages and limitations of each group are summarized.

2912* Argon-Tetramethyl Lead-Methane Proportional and Geiger Counters. Paul E. Damon and Robert F. Overman. *Nucleonics*, v. 10, Jan. 1952, p. 64-65.

2913* Ultrasonic Equipment Testing in the Petroleum Industry. Dwight J. Evans. *Oil and Gas Journal*, v. 50, Feb. 4, 1952, p. 70-72, 82, 84.

Deals with the ultrasonic instruments used both for detection of hidden flaws and measurement of metal thickness, as exemplified by the "Reflectoscope" and the "Audigage." Illustrations.

2914 A Monochromatic Depolarizer. Bruce H. Billings. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 966-975.

Describes a simple monochromatic depolarizer, which consists of two variable-wave plates whose axes are separated by an angle of 45°. Also discusses the Lyot depolarizer which is effective for light over a wide wavelength range.

2915 A Grating Spectrophotometer for the Ultraviolet and Visible Regions. T. B. Thomas and E. E. Schneider. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 1002-1010.

Describes the above giving diagrams.

2916 A Differential Refractometer. B. A. Brice and M. Halwer. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 1033-1037.

Design and performance of an absolute deviation type of above instrument is described. The apparatus comprises mercury and sodium lamps, monochromatic filters, slit, differential cell, projection lens, and micrometer microscope, all accurately aligned on an optical bench. 20 ref.

2917 An Ordinate Printing Attachment for the G. E. Recording Spectrophotometer. O. E. Miller. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 1060-1061.

Describes and illustrates the above attachment which records automatically the ordinate values corresponding to particular wavelength settings of the instrument.

2918 New Data on the Thermal Conductivity of Optical Crystals. Kathryn A. McCarthy and Stanley S. Ballard. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 1062-1063.

The above was determined with an improved model of a previously described apparatus. Data on various materials are tabulated.

2919 Area Type Meters in Refining Applications. John O. Larson. *Petroleum Engineer*, v. 24, Jan. 1952, p. C15-C20.

Describes the Armored Flowrator meter, which utilizes a precise cold-formed metal metering tube and is adaptable to any type of indicating or transmitting extension that can be easily applied to various problems such as the orifice meter. Comparison with other meters is given.

2920 Comparison of Geiger and Proportional Counters for Intensity Measurements in X-Ray Diffraction. U. W. Arndt and D. P. Riley. *Proceedings of the Physical Society*, v. 65, sec. A, Jan., 1952, p. 74-75.

Presents results of an investigation on the above.

2921 An Interferometric Method of Studying Local Variations in the Refractive Indices of a Solid. R. C. Faust. *Proceedings of the Physical Society*, v. 65, sec. B, Jan. 1, 1952, p. 48-62.

26 references.

16. *Apparatus, Methods, and Standards*

2922 Resistance-Wire Computing Device for Solving Algebraic Equations. C. V. Ramamoorthy and W. W. Soroka. *Product Engineering*, v. 23, Feb. 1952, p. 134-137.

Describes construction of a simultaneous equation-solving device, its operation, and results obtained in use to solve a problem of vibration isolation. Experimental results obtained are compared with theoretical results of an exact analytical solution for steady-state response of the system.

2923* A Professional Type Geiger Counter. Loren C. Watkins, Jr. *Radio & Television News*, v. 47, Feb. 1952, p. 35-37, 160.

Gives construction details on a thoroughly tested and practical low-cost counter which is easy to build.

2924* Automatic Control in Industry. A. Tustin. *Research*, v. 5, Jan. 1952, p. 10-15.

First of a series of articles on automatic control which will attempt to discuss some of the latest developments and to point out conditions under which automatic control can be of the greatest advantage.

2925* Photo-Flash Lamps. Marcel LaPorte. *Research*, v. 5, Jan. 1952, p. 26-33.

The electronic flash lamp has become a familiar part of the equipment of the press photographer, but its potentialities as a source of high intensity periodic lighting have been little explored. Describes the author's work on design and construction of high-powered lamps and their application to motion-picture photography. Important applications include study of the kinetics of reactions by means of motion-picture-spectrography; and the filming of living microscopic preparations under the phase-contrast microscope. 10 ref.

2926* Measurement of Low Energy β-Emitters by Liquid Scintillation Counting. B. N. Audric and J. V. P. Long. *Research*, v. 5, Jan. 1952, p. 46-47.

Data on above are charted and tabulated.

2927 Measurement of the Thickness of Metal Plate by Ultrasonic Harmonic Method. I. On the Condition of the Thickness Resonance. (In English.) Sakae Tanaka. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 2, Dec. 1950, p. 917-924.

Presents a theoretical demonstration relating to the resonance of the mechanical vibrating system, composed of a quartz plate coupled to a metal plate through an oil film.

2928 A Microspectrophotometer Equipped With Photomultipliers. Paul W. Lange and Ake S:son Stenius. *Review of Scientific Instruments*, v. 22, Dec. 1951. p. 865-868.

A spectrophotometer, equipped with photomultiplier tubes, is described for the wavelength range 2500-7000A. The apparatus is intended for determination of light absorption in microscopic objects and is especially useful for studies of biological material. Some applications to small parts of cellulose and wood fiber are given.

2929 An Interferometric Micro-Electrophoresis Apparatus. W. Lotmar. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 886-890.

Describes and diagrams above apparatus based on interferometry. Details of the optical and electrical equipment are given. Typical results are presented.

2930 An Electron Microscope Photometer. F. A. Hamm. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 895-898.

Describes an apparatus for measuring the intensity of the focused electron beam as it passes through the final viewing chamber of the electron microscope.

2931 High Pressure BF_3 Proportional Counters. V. Cocconi Tongiorgi, S. Hayakawa, and M. Widgoff. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 899-904.

Construction and filling procedures are described for the above. Examples are given of plateau and bias curves obtained for different values of gas multiplication. Effect of the electron affinity of the BF_3 is discussed, and effect of counter parameters on survival probability of the electrons is shown.

2932 Scintillation Counters for Radioactive Sample Measurement. H. O. Anger. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 912-914.

A gamma-ray counter for liquid or solid samples and a directional gamma-ray counter are described.

2933 The Panradiometer: An Absolute Measuring Instrument for Environmental Radiation. Charles H. Richards, Alice M. Stoll, and James D. Hardy. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 925-934.

Describes the above which consists of 4 hollow, Ag spheres 6 mm. in diam. Measurement of direct solar radiation exclusive of reflection and scattered solar radiation is made by comparing total radiation in sunlight with that obtained when the spheres are shaded from the sun. The radiant temperature of the environment is obtained by correcting measured value of total radiation for effect of solar radiation. A precision of $\pm$ 4% for solar radiation and of $\pm$ 1.8°C. for radiant temperature of the surroundings can be achieved.

2934 A Microilluminator for the Study of the Infrared Spectra of Small Samples at Low Temperatures. Richard M. Badger and Roger Newman. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 935-936.

An instrument is described which combines the functions of a reflecting microscope and a low-temperature cell. It permits infrared absorption spectra to be obtained on single microcrystals at low temperatures, using polarized radiation.

2935 Temperature Regulations in Induction Heating. Homer E. Henschen, James W. Edwards, and Herrick L. Johnston. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 987-988.

Describes improved apparatus for the above, in the design of a temperature regulator for induction heating previously discussed. Eliminates the optical lever by use of vacuum-tube amplifiers, thus improving sensitivity and eliminating the large time-constant of the galvanometer used in the earlier circuit.

2936 An Induction Flowmeter Design Suitable for Radioactive Liquids. W. G. James. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 989-1002.

Presents a brief discussion of the principle of the induction flowmeter and discusses considerations necessary for applying it to the measurement of radioactive-liquid flow rates of the order of 50 ml. per min. These considerations were applied to the design of a 0-50 ml./min. flowmeter. 33 ref.

2937 An Inexpensive Thyratron Controlled Thermostat Relay. Charles M. Proctor. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 1023-1024.

Describes and diagrams the above.

2938 The Adaptation of a Geiger Counter to the Weissenberg Camera. D. F. Clifton, Aaron Filler, and D. McLachlan. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 1024-1025.

Describes briefly the Geiger-counter attachment developed and used at the University of Utah. Diagrams.

2939 Interchangeable Glass-to-Metal Seals for High Vacuum Work. H. R. Dvorak and R. N. Little, Jr. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 1027-1028.

Discusses need for the above in view of cleaning, heating, and cooling problems. Two types developed are diagrammed.

2940 A Simple, Effective High Pressure Valve. E. W. Comings and H. G. Drickamer. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 1028.

Describes and diagrams the above, giving its advantages.

2941 Measuring the Load-Deflection Properties of Vibration-Control Mountings and of Elastomers. *Rubber Age*, v. 70, Jan. 1952, p. 475-476.

Describes and illustrates newly designed apparatus for the above.

2942* More Recent Development of the "Pasted-On" Electrical Resistance Pickup and Importance of the Wheatstone Circuit as a Measuring Method. (In German.) A. U. Huggenberger. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 17, Nov. 1951, p. 321-332.

Describes modifications of the American SR-4 strain gage, showing diagrams and photographs to illustrate principles and designs. Data are charted and tabulated.

2943* The Triaxial Institute Kneading Compactor. Martin Ekse. *Trend in Engineering at the University of Washington*, v. 4, Jan. 1952, p. 4-7.

Describes, diagrams, and illustrates compacting machine for the fabrication of soil samples and bituminous mixture samples in the laboratory. It was developed under sponsorship of the Triaxial Institute, which is concerned with development and standardization of the principles of triaxial testing.

2944 High-Pressure Measurements With Elastic Measuring Tubes. (In German.) Walter Wuest. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93, Dec. 21, 1951, p. 1129-1131.

Describes and illustrates use of concentrically and eccentrically bored tubes for above purpose. Results show a fairly close correlation between measured and theoretical pressures. Data are graphed and tabulated.

2945* The Field-Ion Microscope. (In German.) Erwin W. Müller. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 136-142.

Shows that adsorbed ions can be "pulled off," as positive ions, from the tip of the object by reversing the polarity of the field-electron microscope and that rapid "feeding" of adsorbed atoms permits the field-ion emission to produce an image of the tip surface whose resolution is equal to lattice dimensions. Illustrated. 10 ref.

2946* Methods and Application of Electron Diffraction in Industrial Research. (In German.) Adrian Stahl. *Zeitschrift für angewandte Physik*, v. 3, Sept. 1951, p. 349-360; Oct. 1951, p. 382-396.

Reviews the above on the basis of the literature. Discusses in particular the theoretical basis, the apparatus used, and the testing of materials. 552 ref.

2947* The Measuring Accuracy of Filament Pyrometers. (In German.) J. Euler and W. Schneider. *Zeitschraft für angewandte Physik*, v. 3, Dec. 1951, p. 459-467.

Experimental and theoretical studies show that a well-built filament pyrometer can measure temperatures with a high degree of accuracy. Includes diagrams, graphs, and tables. 12 ref.

2948* The Thermocouple as a Radiation Meter; Critical Discussion and Survey of the Present Status of Development. (In German.) L. Geiling. *Zeitschrift für angewandte Physik*, v. 3, Dec. 1951, p. 467-477.

Study of various types of thermocouples includes discussion of Seebeck effect, Lorenz number, determination of temperature and resistance noises as sources of interference, computation of inertia of thermocouples, and comparative results. Diagrams and tables. 28 ref.

Miscellaneous Publications

2949 Method of Sorting Steels Based on Sign of Thermoelectric Effect. S. V. Skorikov, A. I. Askenazi, and M. V. Dekhtyar. Henry Brutcher, Translation 2767, 9 pages. (From *Zavodaskaya Laboratoria*, v. 11, no. 1, 1945, p. 95-98.)

Describes development of a routine method for sorting of steel, based on the sign (not the magnitude) of thermoelectric force.

2950 A Magnetic Oxygen Recorder for the Automatic Control of a Catalytic Purification Plant. R. H. Griffith. Institution of Gas Engineers (London), Communication 395, Nov. 1951, 13 pages. (TP700 In8C)

Among the normal components of coal gas, oxygen is outstanding in being strongly magnetic. This property is the basis of an instrument designed to record the O_2 content of a gas in the range 0-2% by volume.

2951 Direct Measurements of Skin Friction. Satish Dhawan. National Advisory Committee for Aeronautics, Technical Note 2567, Jan. 1952, 60 pages. (TL570 Un3t)

A device was developed to measure local skin friction on a flat plate by measuring the force exerted upon a very small movable part of the surface. The apparatus was first applied to measurements in the low-speed range, both for laminar and turbulent boundary layers. It was then applied to high-speed subsonic flow and turbulent-skin-friction coefficients determined up to a Mach number of about 0.8. A few measurements in supersonic flow were also made. Data are graphed. 26 ref.

2952 Method and Application of Differential Thermal Analysis. Ralph E. Grim. *Annals of the New York Academy of Sciences*, v. 53, July 20, 1951, p. 1031-1053. (Q11 N49a)

Describes the above in detail. Curves for mica and several clay minerals are presented. 45 ref.

Books

2953 An Introduction to the Theory of Control in Mechanical Engineering R. H. MacMillan. 195 pages. 1951. Cambridge University Press, London. (TJ1055 M22a)

A complete survey of the design and operation of automatic controls. Theoretical and mathematical analysis. 108 ref.

2954 The Preparation of Programs for an Electronic Digital Computer. With Special Reference to the EDSAC and the Use of a Library of Subroutines. Maurice V. Wilkes, David J. Wheeler, and Stanley Gill. 167 pages. 1951. Addison-Wesley Press, Cambridge, Mass. (QA75 W65p)

The methods of preparing programs for above computer were developed with a view to reducing to a minimum the amount of labor required, thus making it feasible to use the machine for problems which require only a few hours of computing time as well as for those which require many hours.

See also:

2492 (method of testing welds)
2601 (β-ray radiography of metals and minerals)
2604 (electron microscopy of metallic smokes)
2630 (determination of X-ray intensities)
2667 (liquid metals for heat transfer)
2677 (hysteresis potentiometer)
2678 (hysteresis-loop tracer for thin layers)
2686 (specifications for steel bridges)
2697 (specifications for power-plant piping)
2808 (internal-standard flame photometry)
3149 (pneumatic control systems)
3194 (fluid mechanics in pilot-plant studies)
3195 (steam-jet ejectors for vacuum cooling)
3346 (controlling level of low-boiling liquids)
3478 (X-ray spectrometer)
3542 (radiographic method for miscellaneous materials)
3575 (metal thickness meter)
3610 (nuclear magnetic-resonances detector)
3674 (instrument electronics)
3676 (instrument electronics)
3697 (analogue computer research—M.I.T.)

17. METALS—FABRICATION AND USES

2955* Use of Materials; Problems of Application in Advanced Aircraft. H. H. Gardner. *Aircraft Production*, v. 14, Jan. 1952, p. 16-18.

Discusses some materials and the characteristics that warrant their application to specific structural problems. Includes Al-Zn-Mg alloys, carbon steels, ferritic steels, and Ti.

2956 Lead in Modern Chemical Construction. Kempton H. Roll. *Chemical Engineering*, v. 59, Jan. 1952, p. 281-282, 284-286, 288-290.

Latest techniques and improvements in the above are discussed. Includes methods of supporting sheet lead, new methods of testing lead linings and welds, lead bonded to steel, lead-covered Cu or steel heating coils, and use of acidproof brick with an impervious lead interliner.

2957* ACSR in Overhead Distribution. R. W. Westphal and C. E. Topping. *Electric Light and Power*, v. 30, Feb. 1952, p. 110-117.

Presents construction details and problems involved in using steel-reinforced Al conductors to replace Cu for power-distribution systems. Sketches show construction standards, pole and house connections, and clamps designed for bimetallic connections.

2958* Aluminum Needs Good Connections. Julian Rogoff and Irving Matthysse. *Electric Light and Power*, v. 30, Feb. 1952, p. 118-122.

Describes a test program conducted in an effort to overcome the following characteristics of Al antagonistic to good electrical

17. *Metals—Fabrication and Uses*

joints: oxide coatings, poor electrical conductivity, eelctrolytic corrosion, and softness which causes excessive creep.

2959* Aluminum Substation Structures Offer Attractive Possibilities. *Electric Light and Power*, v. 30, Feb. 1952, p. 131.

Presents the advantages of Al over steel for the above application. Mentions reduced maintenance, greater safety, and saving in erection time and costs.

2960* The "How To" of Aluminum in Distribution. C. E. Topping. *Electrical World*, v. 137, Feb. 11, 1952, p. 97-100.

Discusses use of Al in power-distribution systems.

2961* Electrical Sheet Steel. P. Butler. *Proceedings of the Institution of Electrical Engineers*, v. 99, Pt. 1, Jan. 1952, p. 30-31. (A condensation.)

Discusses the differences in hot-rolled and cold-rolled core materials.

2962 SAE Charts Simplify Selection of Heat Treatable Steel. E. H. Stilwill. *Iron Age*, v. 169, Feb. 14, 1952, p. 130-133.

Selection of substitute steels is simplified by use of new metallurgical tables prepared by the Iron & Steel Technical Committee of the Society of Automotive Engineers. Tables take into account both section size and quenching medium to be used. They also differentiate between highly stressed parts requiring nearly an all-martensitic structure on the quench and those which do not have to be "quenched out."

2963 How to Select Steels for Low Temperature Service. John L. Everhart. *Materials & Methods*, v. 35, Jan. 1952, p. 75-79.

Discusses the above from the viewpoint of metallurgical and mechanical factors. Melting procedure, chemical composition, finishing temperature for hot rolling, internal structure, grain size, and heat-treatment influence the temperature at which the steels become embrittled. Design of the part, presence or absence of notches, restraint, type of loading, size and shape influence the manner of failure. Extensive tabulated data give mechanical properties of various carbon and low alloy steels at low temperatures, effect of sustained stress, and effect of melting practice on impact strength. 18 ref.

2964 Aluminum Alloy Die Castings Used in Complex Automotive Parts. T. C. Du Mond. *Materials & Methods*, v. 35, Jan. 1952, p. 80-81.

Describes the above application and discusses the advantages in using Al.

2965 Copper-Clad Aluminum Can Conserve Copper in Many Uses. John L. Everhart. *Materials & Methods*, v. 35, Feb. 1952, p. 82-85.

Discusses mechanical and physical properties of Cu-clad Al. Fabrication, annealing, and joining are briefly discussed. Various applications are given.

2966 Boron Treated Types of Alternate Steels. *Materials & Methods*, v. 35, Feb. 1952, p. 127, 129.

Presents tables indicating some of the applications in which boron steels have substituted successfully for more common standard steels.

2967* Testing of Various Materials for Connecting-Rod Bearings, With Particular Emphasis on Conditions in the Ford-V8 Motor. (In German.) K. Longard. *Metall*, v. 5, Nov. 1951, p. 480-485; Dec. 1951, p. 539-544.

Reports on investigations made in order to develop a testing method for above materials in aircraft motors which would duplicate actual working conditions. Of the great number of contributing factors, 3 were chosen for closer scrutiny: the bearings, the lubricant, and the shaft system. Mechanical and physical test results for various ferrous and nonferrous alloys are discussed in detail. 17 ref.

2968 A Successful Experiment With Broaches. W. Jubb. *Metallurgia*, v. 45, Jan. 1952, p. 11.

A carbon case-hardened steel and a Ni-Cr case-hardened steel were used to make a set of broaches. Performance of these materials is described.

2969 Light Metal Castings for Aircraft Structures. Keith F. Finlay. *Metal Progress*, v. 61, Jan. 1952, p. 81-83.

Discusses the above with reference to future trends. Criticisms of existing practices are given. Emphasis is on Al and Mg, with brief mention of Ti.

2970 Drilling With Coromant Equipment. J. Fred Johnson. *Mining Engineering*, v. 4, Jan. 1952, p. 37-41.

Coromant is the trade name of an alloy-steel drill rod tipped with a chisel-type WC bit. Evaluates this equipment, giving detailed information on history of development, advantages and disadvantages, comparative performance of steel and WC bits, and footage drilled per bit in various types of rock.

2971 The Selection and Use of Drill Steel. Charles M. Cooley. *Mining Engineering*, v. 4, Jan. 1952, p. 43-46.

A discussion of important points to be considered in the above: Types of drill steel available, life of drill rod and its determination, stresses in drill rod that cause typical failures encountered, and heat treatments and surface treatments for improving service life.

2972* Offset Aluminum "Decals." Ray Bloomberg. *Modern Lithography*, v. 20, Jan. 1952, p. 51, 53.

The above are made of aluminum stock 0.003 in. thick, on which are imprinted type or designs, with a cellophane-covered cement backing for easy application. The process consists of creating a color-retentive coating on the surface of the foil by chemical means, then applying the printing by a standard Multilith offset process, in any color.

2973* Aluminum in General Line Containers. *Modern Metals*, v. 7, Jan. 1952, p. 24-28, 30.

Deals with miscellaneous packaging containers developed in England and Europe. A few typical examples are illustrated. Among the subjects covered are: narrow-drawn, deep-drawn, impact-extruded, and built-up containers; lids and covers of all types; methods of manufacture; finishing; and decoration.

2974* Why Magnesium in Aircraft Construction? R. Smallman-Tew. *Modern Metals*, v. 7, Jan. 1952, p. 33-35.

Discusses pros and cons of Mg in aircraft. Cites some replacement examples in Roe's Jetliner, the first jet-powered commercial plane.

2975* B-36 Experience With Magnesium. D. A. Tooley. *Modern Metals*, v. 7, Jan. 1952, p. 49-50, 52-54.

Strategic Air Command's B-36 intercontinental bomber contains more Mg than any other production-model airplane. The air-frame alone is said to contain 8000-9000 lbs. of Mg. Tells what the magnesium industry should do to stimulate use of their metal by aircraft companies. Considers fatigue properties, corrosion-preventive coatings, new alloys, and standard sizes available in various shapes.

2976* Successful Foil-Kraft Drum. *Modern Packaging*, v. 25, Jan. 1952, p. 105-107.

Describes containers for oil and grease. The top and bottom are of sheet steel; the sides are formed of multiple plies of Al foil laminated to Kraft linerboard.

2977 New Ordnance Materials. Benjamin S. Mesick. *Ordnance*, v. 36, Jan.-Feb. 1952, p. 573-576.

Discusses the lighter, stronger metals and plastics which will increase our airborne firepower. Mentions specifically new welding electrodes for armor plate, ductile cast iron, Al, Mg, Ti, rubber, plastics, and adhesives. Unsolved problems are indicated.

2978* The Selection of Aluminum Alloys for Shipbuilding. (In English.) D. W. Taylor and W. Muckle. *Schweizer Archiv fur angewandte Wissenschaft und Technik*, v. 17, Dec. 1951, p. 365-379.

In Part I, choice of the preferred alloys is considered in relation to economic production in the rolling mill of the required sizes of plate and sections and to influence of chemical composition on rolling and mechanical properties. Examples of manipulation of material in the shipyard are presented and methods of joining are discussed. Mention is made of the weathering characteristics of the alloys. In Part II the different parts of a ship in which Al alloys can be used are discussed.

The choice of material in relation to strength requirements is discussed and some examples are given of the weight saving which can be achieved. The influence of weight saving on design is discussed.

2979 High Lead Copper-Lead Bearings Developed for Slow Speed Diesels. Albert Willi, Jr. *Steel*, v. 130, Feb. 4, 1952, p. 94, 96, 114.

Discusses the application of Cu-Pb bearings to unhardened crankshafts. Describes improved casting technique, fatigue, and corrosion resistance.

2980 A Laboratory for the Production of Zirconium Ignition Pastes for Photographic Flashlamps. William C. Fink. *Sylvania Technologist*, v. 5, Jan. 1952, p. 7-9.

The properties and applications of Zr are discussed and the hazards involved in handling Zr powder are considered. Design of a laboratory for work involving this material is described. 18 ref.

See also:
2431 (gray iron for cylinder sleeves and liners)
2433 (applications of Cu-Ni casting)
2435 (lead bronze bearings)
2486 (parts made from Fe powders)
2525 (carbon drill steels)
2658 (metallic sheets for radiant-heat protection)
2667 (liquid metals for heat transfer)
2686 (railway iron and steel structures)
2712 (application of carbides)
2717 (alloys for gas-turbines)
2722 (heat-resisting steels for gas turbines)
2740 (Al for storage tanks)
3142 (substitute spring materials)
3418 (metals for industrial piping)
3721 (Al for electrical and mechanical applications)
3732 (future possibilities for Al)
3750 (steels for machinery)

18. POLLUTION AND WASTES

2981 Disposal of Industrial Waste Waters: (a) in the United States. F. W. Mohlman. **(b) Great Britain.** B. A. Southgate. *Chemistry & Industry*, Dec. 31, 1951, p. 1224-1234; disc., p. 1234.

Discusses classification of industrial wastes and deals with specific examples of abatement in the various classes. Compares standards of pollution control, pre-treatment and re-use of waste waters. Tabulated data. 26 ref.

2982* Investigations Into a New Method of Effluent Liquor Purification. C. Cooper and W. E. Bouch. *Gas World*, v. 134, Dec. 29, 1951, p. 594-600.

Discusses the possibilities of using HNO_3 and HNO_2 for destruction of the residual toxic matter in ammonia still effluents from gas works. 17 ref.

2983 Industrial Wastes. Harold R. Murdock. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 105A-106A, 108A.

Discusses deleterious effects of Cu and Cr wastes to biological sewage-disposal methods. Considers especially problems encountered along the Naugatuck River in Connecticut.

2984 Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 113A-114A, 116A.

Describes efforts being made by Los Angeles nonferrous industries to reduce lead emissions in order to protect employees and improve air hygiene. Refers especially to Pb reclamation and Pb-alloy foundries. Recovery equipment is diagrammed; electron micrographs show structure of fume particles.

2985 Glass Bags Clean California Air. Paul Siechert and Harold B. Menardi. *Iron Age*, v. 169, Jan. 24, 1952, p. 78-80.

Describes and discusses smoke-control equipment, installed at a gray-iron foundry in Alhambra, Calif., which has effectively removed particulate matter from cupola emission. Silicone-impregnated glass bags are expected to last 2 yrs. in service. Cupola gases are cooled by recirculated quench air from cooling flues.

2986* Waste Disposal in the Cotton Textile Industry. Edward Abrams. *Journal of Southern Research*, v. 4, Jan.-Feb. 1952, p. 11-13.

Discusses effect on stream purity, and treatment of textile and dye wastes.

2987* Removal of Radioactive Waste From Water. Conrad P. Straub. *Nucleonics*, v. 10, Jan. 1952, p. 40-44.

Describes and illustrates equipment and procedures of pilot plant at Oak Ridge National Laboratory that uses conventional water-treatment processes for the above. Data are charted and tabulated.

2988* Problems in the Use of Fission Products. *Nucleonics*, v. 10, Jan. 1952, p. 45-47.

Wide industrial use of reactor wastes is indicated by an AEC-sponsored Stanford Research Institute study. The findings, summarized here, show that many problems remain to be solved.

2989* Direct Steaming Solves Smoke Problem at Freight Terminal. John M. Dyke. *Power*, v. 96, Feb. 1952, p. 82-85.

Tells how one of Canada's largest railroads eliminated air pollution at a new freight terminal yard in Montreal by direct-steaming of cold locomotives from recently built central steam plant.

2990* Designing Stacks: Crystal-Ball Job? G. V. Williamson. *Power*, v. 96, Feb. 1952, p. 88-90, 224, 226, 228.

Discusses design of smoke stacks in light of air-pollution ordinances.

2991* Deinking in New England; How Falulah Paper Co. Does It. *Pulp & Paper*, v. 26, Feb. 1952, p. 57-58, 60.

Detailed discussion of waste treatment and stream pollution control by pulp and paper mills.

2992* Procedures for Sampling and Measuring Industrial Wastes. Hayse H. Black, *Sewage and Industrial Wastes*, v. 24, Jan. 1952, p. 45-65.

Reviews the above. 17 ref.

2993* Waste Pickle Liquor Treatment and Disposal. I. Problem of Waste Pickling Liquor Disposal. Thomas F. Reed. **II. Waste Pickle Liquor Treatment by Armco Steel Corporation at Butler, Pa.** Grant A. Pettit. **III. Waste Pickle Liquor Disposal by Walker of Conshohocken.** W. A. Cubberley and C. J. Lewis. **IV. Central Treatment Plant for Waste Pickle Liquor.** John H. Harper. *Sewage and Industrial Wastes*, v. 24, Jan. 1952, p. 66-82.

2994* Interrelationship of Air Pollution and Water Pollution. Louis C. McCabe. **Discussion.** M. Allen Pond, and E. Neil Helmers. *Sewage and Industrial Wastes*, v. 24, 1952, p. 83-91.

Discusses the above with emphasis on the mineral industry.

2995* Ash and Flue Gases From Burning Sulphite Waste Liquor. Alex Scholander. *Tappi*, v. 35, Jan. 1952, p. 1-4.

Amounts and concentrations of ash and SO_2 from sulfur-liquor fuel are reported and discussed. Composition of the ash is given and discussed with respect to burning of the liquor and troubles observed in boilers due to deposits in the superheater. A new furnace and modifications in the fire room have led to good burning conditions. The damaging effects of SO_3 are discussed. Possibilities of elimination by a scrubbing process were studied on a laboratory scale and measured in some industrial scrubbers. 11 ref.

2996* Waste Water Disposal Program, Scott Paper Co., Chester, Pa. D. R. Wadleigh and L. G. Simons. *Tappi*, v. 35, Jan. 1952, p. 16-21.

Includes diagrams, graphs, and tables.

2997* Utilization of Sulphite Waste Liquor; A Bibliography of the Literature From July 1943, to December, 1950. H. Bordon Marshall and A. Margaret Johnson. *Tappi*, v. 35, Jan. 1952, p. 146A-180A.

A classified bibliography, including abstracts of the articles listed.

18. *Pollution and Wastes*

Miscellaneous Publications

2998 The Treatment of Gas Works Liquor in Admixture With Sewage in Percolating Filters. W. H. Blackburn, T. G. Tomlinson, and T. H. Summers. Gas Research Board (England), Communication 63, 47 pages. (TP700 G21c)

Experiments were made on the effect of spent-gas liquor, and fractions of crude-gas liquor on biological filtration of settled sewage. Illustrations, graphs, and tables. 16 ref.

See also:
2409 (recovery of Ge and Ga from flue dusts)
3035 (dust emission from stoker-fired furnace)
3039 (electrostatic air filters)
3208 (treatment of papermill wastes)

19. FUEL TECHNOLOGY

2999* Flameless Combustion of Gases. (In Russian.) L. N. Khitrin. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 475-478.

The catalytic combustion of gaseous mixtures was studied. Data are discussed, tabulated, and charted. 13 ref.

3000 Effect of Composition on Burning Velocities in Hydrogen-Bromine Mixtures. Stone D. Cooley, James A. Lasater and Robbin C. Anderson. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 739-743.

The effects of the type of atmosphere, size of burner tube, position of burner, etc., was investigated. Maximum burning velocity observed, for mixtures at 49°C. and atmospheric pressure, was 32 cm./sec. at 41-44 mole % Br. Absolute values of burning velocity depended somewhat upon experimental conditions, but the trend of variations with composition was not affected. 11 ref.

3001* The Burning of Low-Grade Coal Fines. *B.C.U.R.A. Quarterly Gazette*, no. 14, 1951, p. 2-6.

Covers difficulties in the above. Describes the Cyclone burner and a gas-turbine experimental combustor. Discusses principles of combustion. Flow diagram.

3002 Why Not Hoist Coal by Pumping? *Coal Age*, v. 57, Feb. 1952, p. 101.

Successful operation of an experimental hydraulic hoist at Calumet & Hecla's zinc mine at Shullsburg, Wis., suggests adaptation of the principle to hoisting coal. Illustrations.

3003* Calculating the Aerodynamic Field of Stabilized Flames. (In French.) Jean Fabri, Raymond Siestrunck, and Claude Fouré. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Nov. 19, 1951, p. 1263-1265.

Presents a mathematical study of the above.

3004* Filtration of Fuels and Lubricants. Charles A. Winslow. *Diesel Power and Diesel Transportation*, v. 29, Dec. 1951, p. 62-66.

Filtration of crude oil and natural gas is covered, and a recommended system for the former is illustrated.

3005* Gasification Diagrams. (In German.) F. Bosnjakovic. VDI-Forschungsheft 432 (Supplement to *Forschung auf dem Gebiete des Ingeniourwesens*, v. 17, sec. B, 1951), p. 27-40.

New diagrams are given for determination of enthalpy, temperature, and composition of the gas produced in gas generators at different working conditions for adiabatic and non-adiabatic operation. Emphasizes the gasification of coke with and without formation of methane. Influence of fuel composition, steam supply, and working conditions on gas quality is given. 17 ref.

3006* Some Aspects of the Ultrafine Structure of Lignites. N. Berkowitz and H. G. Schein. *Fuel*, v. 31, Jan. 1952, p. 19-32.

Discusses and presents tabulated data on a series of Southern Hemisphere lignites with respect to heats of wetting in methanol and water, adsorption, tectonic influences, and colloid structure. 13 ref.

3007* A Test of a Reported Effect of Pulverization Upon the Carbonization Properties of Coal. A. K. Mandal and A. A. Orning. *Fuel*, v. 31, Jan. 1952, p. 33-36.

Presents results of studies made with American coals to test a reported effect of pulverization on the carbonization properties of German coals. Oxidation rather than pulverization is concluded to be responsible for the observed effects.

3008* Stability of Burner Flames for Binary and Tertiary Mixtures of Methane, Carbon Monoxide and Water Vapour. P. L. Walker, Jr. and C. C. Wright. *Fuel*, v. 31, Jan. 1952, p. 37-44.

The above was correlated using the velocity gradient concept for laminar flow proposed by Lewis and von Elbe. Effect of composition changes in both dry and wet CH_4-CO mixtures upon flash-back and blow-off is non-linear. Increases in H_2O-vapor content increase the velocity gradient for both blow-off and flash-back of CO and to a lesser degree decrease the velocity gradient for CH_4.

3009* Stability and Burning Velocity of Bunsen Flames With Propane-Carbon Monoxide Mixtures. P. L. Walker, Jr., and C. C. Wright. *Fuel*, v. 31, Jan. 1952, p. 45-49.

Blow-off, flash-back and burning velocity data are presented for "commercial grade" propane, "pure grade" cylinder CO and for mixtures of the two gases. The effect of composition changes is shown to be non-linear.

3010* A Method of Classifying the Behaviour of Scottish Coal in the Open Grate. E. A. C. Chamberlain. *Fuel*, v. 31, Jan. 1952, p. 50-61.

Describes a laboratory method of measuring radiant heat output and reactivity which enables a classification to be made that accurately reflects consumer choice. Typical results for two groups, one of 53 and the other of 42 coals, from 2 areas in Scotland are given to demonstrate the classification and alignment.

3011* Hardy Process of Coal Dust Agglomeration Without the Use of a Binder. G. Dairmont. *Fuel*, v. 31, Jan. 1952, p. 75-90.

Influence of the above on the properties of coal was examined and temperature limits within which it can be applied are defined. Addition of powdered infusible admixtures is also considered. The agglomeration of coal dust, and mixtures of coal dust with other materials plasticized by heating while in motion, was investigated experimentally on a bituminous coal alone, and on mixtures of coal and coke. Factors governing mechanical strength of the agglomerates and causes of the formation of fissures are deduced from these experiments.

3012* Gasification by the Moving-Burden Technique. Part I. J. W. R. Rayner. *Gas Times*, v. 70, Jan. 11, 1952, p. 30, 32, 37, 39.

The success of the fluidized-solids process for catalytically cracking petroleum suggested a new technique for gasification. The two reactions involved in the gasification of coke, namely, the exothermic oxidation reaction between air and coke, and the endothermicreaction between steam and coke, are carried out in separate vessels. The heat produced in the exothermic reaction is carried to the steaming vessel by the circulating burden. Each vessel is designed for the conditions required by each. Air rather than oxygen is used for the exothermic reaction without contaminating the water gas with the products of combustion. Includes schematic diagrams.

3013* Production of Gases From Coal; Economics of Most Common Methods of Generating Gas. (In German.) F. Wehrmann, J. Schonz, J. Horchemer, and W. A. Frey. *Gas und Wasserfach*, v. 92, Oct. 31, 1951, p. 269-273; Nov. 15, 1951, p. 296-303; Dec. 15, 1951, p. 327-330.

Part I discusses ways of increasing gas yield from coal distillation. Part II compares the generation of water gas with the generation of producer gas. Also discusses the problem of coals with high and low contents of volatile matter and of optimum utilization of the furnace chamber. Part III. (Nov. 15 issue) discusses ways of computing and accounting for costs of generating gas. Concluding article includes a table and charts which summarize gas yields and costs by plant and type of generated gas. Data are graphed and tabulated.

3014 Let's Take Another Look at the Fuel Situation. Kalman Steiner. *Heating, Piping & Air Conditioning*, v. 24, Jan. 1952, p. 117-121.

Discusses the fuel situation from the aspects of synthetic fuels, coal conversion, lignite fuel, liquefied petroleum, hydraulic transportation of coal, and effect of the Iran situation.

3015* Theoretical Considerations on the Propagation of Flames. I. Rates. II. Regions in Which Propagation is Possible. (In French.) P. Blanquet and M. F. Hoare. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Sept.-Oct. 1951, p. 399-406.

Describes a theory of the propagation of flames which approaches the problem by considering both thermal conductivity and delays in ignition. Includes diagrams. 23 ref.

3016* Petroleum Chemicals. A. E. Williams. *Mining Magazine*, v. 106, Jan. 1952, p. 9-15.

A survey of progress in the United Kingdom.

3017 Polyhedral Diffusion Flames. J. E. Garside and B. Jackson. *Nature*, v. 168, Dec. 22, 1951, p. 1085.

Burner flames of unusual structure may be obtained when certain hydrocarbon gases and vapors are burnt in admixture with air or oxygen. During the course of an investigation into the processes responsible for the formation of polyhedral flames, it was found that the phenomenon is not confined solely to aerated flames, but may occur also with flames of the diffusion type provided that an inert gas mixed with the inflammable gas prior to combustion.

3018 Spectra of Flames Burning With Oxides of Nitrogen. B. B. Fogarty and H. B. Wolfhard. *Nature*, v. 168, Dec. 29, 1951, p. 1122.

Discusses the characteristics of H_2, NH_3, Co and hydrocarbons burning with NO, N_2O, and N_2O_3. Comparison is made with other flame spectra.

3019 Synthetic Liquid Fuels—When and How? Eugene Ayres. *Petroleum Processing*, v. 7, Jan. 1952, p. 41-44.

Discusses the production of liquid fuel from coal and oil shale as a part of the future industrial picture. Considers modifications of the Fischer-Tropsch reaction as the most likely method for synthesis.

3020 Coal Carbonization May Open Door to Commercial Synthetic Fuels. *Petroleum Processing*, v. 7, Jan. 1952, p. 45.

Tells how a sound approach to the commercial production of synthetic liquid fuels may be by means of the low-temperature coal-carbonization method developed by the Pittsburgh Consolidation Coal Co., of Pittsburgh.

3021 A Spectroscopic Investigation Into the Structure of Diffusion Flames. H. G. Wolfhard and W. G. Parker. *Proceedings of the Physical Society*, v. 65, sec. A, Jan. 1, 1952, p. 2-19.

NH_3-O_2, C_2H_4-O_2, and other diffusion flames were examined spectrosopically using the flat-flame technique described in a previous paper. Each flame is shown to consist of a main reaction zone where the temperature is a maximum. The emission from this zone is thermal, and the component gases are in chemical equilibrium. These results and a number of qualitative observations clearly show that diffusion flames with oxygen at atmospheric pressure have the structure predicted for a flame in which diffusion is the rate-determining process. A number of differences are described between the characteristics of diffusion and premixed gas or Bunsen flames. 10 ref.

3022 The Effects of Organic Substances on the Upper Limits of Inflammability of Some Hydrogen-Carbon Monoxide-Air Mixtures. G. Dixon-Lewis and J. W. Linnett. *Proceedings of the Royal Society*, ser. A, v. 210, Dec. 7, 1951, p. 48-69.

Effects of different substances were compared; and it was shown that the oxygen-using capacity of the added substance is most important in governing effect on the limit. However, certain special atoms and groups (e.g. iodide) appear to have appreciable specific, though secondary, effects. The effect of methyl alcohol on the products of combustion and on the limit flame temperatures was also studied.

3023 The Spectrum-Line Reversal Method of Measuring Flame Temperature. A. G. Gaydon and H. G. Wolfhard. *Proceedings of the Physical Society*, v. 65, sec. A, Jan., 1952, p. 19-24.

Processes of electronic excitation in flames are briefly discussed, and it is shown that, if there is lack of equilibrium, the reversal temperature may be closer to the effective vibrational temperature of the surrounding molecules than to the mean translational temperature.

3024* Antiknock Additives for Gasoline. (In Italian.) G. Roberti and E. Pipparelli. *Rivista dei Combustibili*, v. 5, Oct. 1951, p. 556-567.

While use of tetraethyl lead as an antiknock agent in gasoline has been widely developed, other additives have been proposed either as antiknock agents or for other purposes. Metallic and nonmetallic compounds are examined from the point of view of their properties; differences indicating a different antiknock mechanism are pointed out. Graphs and tables.

3025 Spectroscopic Studies of the Hydrogen-Oxygen Explosion Initiated by the Flash Photolysis of Nitrogen Dioxide. R. G. W. Norrish and G. Porter. *Proceedings of the Royal Society*, ser. A, v. 210, Jan. 22, 1952, p. 439-460.

The method of flash photolysis was used to initiate the reaction between hydrogen and oxygen, using a small amount of NO_2 as sensitizer. Dependence of the ignition limits on total pressure, capacity, and pressure of NO_2 were studied, as well as the flash photochemical decomposition of NO_2 alone. 20 ref.

3026 Combustion Characteristics of Diesel Fuels as Measured in a Constant-Volume Bomb. R. W. Hurn and K. J. Hughes. *SAE Quarterly Transactions*, v. 6, Jan. 1952, p. 24-33; disc., p. 34-35.

Data presented show the great effect of aromatic and dicyclic compounds in increasing fuel-ignition lag and temperature sensitivity. Effects of oxygen concentration and influence of a diesel fuel additive are shown. The combustion records of some aromatic fuels suggest a 2-stage combustion process and further emphasize that ignition of fuels is not necessarily a threshold phenomenon. Ignition characteristics of fuels are shown for wide ranges of pressures and temperatures.

3027 Oil From Shale. H. M. Thorne. *Scientific American*, v. 186, Feb. 1952, p. 15-19.

U. S. formations of rock contain far more fuel and chemicals than our entire known reserve of petroleum. Some recent studies show that one such formation could be economically mined now.

3028* Gasifying Washery Rejects and Pulverised Fuel. *South African Mining and Engineering Journal*, v. 62, pt. 2, Dec. 22, 1951, p. 705, 707, 709.

Outlines the attempts made in Germany to find an economical process for gasifying rejects from washeries. Two companies are trying to increase the effective output of their carbonization plants by using gas from low-grade fuels instead of gas produced by coke-fired gas producers.

3029* Flame Propagation in Tube Sections. II. (In German.) H. Behrens. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Dec. 1951, p. 695-696.

Sudden increase in rate of flame propagation of n-heptane-ethylene-acetylene mixtures is explained by secondary formation of soot particles and an increase in thermal conductivity. Includes graphs.

Miscellaneous Publications

3030 Method of Determining the Dynamics of Shrinkage of Coals During Coking. A. E. Bresler. Henry Brutcher, Translation 2763, 14 pages. (From *Zavodskaya Laboratoria*, v. 16, Mar. 1950, p. 291-297.)

Describes the above which is based on dilatometry. Application to the study of various coals is given. Differences among them as reflected in experimental results are discussed.

3031 National Motor-Gasoline Survey. O. C. Blade. U. S. Bureau of Mines, Report of Investigations 4854, Jan. 1952, 24 pages. (TN21 Un3r)

Reports on the properties of motor fuels sold through service stations in the United States. Presents analytical data for 3427 samples, representing the products of 128 companies. The samples were collected during July and Aug. 1951. Numerous graphs and tables.

3032 Some Aspects of the Mechanism of the Gasification of Carbon by Carbon Dioxide and Steam. J. D. F. Marsh.

19. *Fuel Technology*

Institution of Gas Engineers (London), Communication 393, 1951, 21 pages. (TP700 In8c)

Presents results of an investigation on the above. They are used to elucidate the mechanism of the water-gas shift reaction, to decide between various mechanisms that have been proposed elsewhere for the reactions between carbon and CO_2 or steam, and to explain some published observations on the gasification of coke in O_2. 19 ref.

3033 The Entrainment of Air by Flames. W. A. Simmonds and M. J. G. Wilson. Gas Research Board (England), Communication 61, 31 pages. (TP700 G21c)

Experimental techniques were adapted and tested for follow-in the path of secondary air towards and into flames. These methods were applied to small, radially symmetrical flames of methane, hydrogen, and town gas over a range of rates of flow. In this way the flow patterns were mapped and measurements of the velocity of the air movement towards the flame were obtained. Illustrations, graphs, and tables. 12 ref.

3034 Target Impact Gas Burners. W. A. Simmonds and A. L. Willett. Gas Research Board (England), Communication 65, 29 pages. (TP700 G21c)

The performance of a new type of non-aerated burner was investigated. The burner is of very simple design and consists of an orifice by means of which a jet of gas is directed towards a target. The effect of this target is to turn the jet into a thin sheet of gas in the form of a disc flowing away from the jet. The flame stabilizes itself at some position on this sheet of gas and a disc of flame is thus obtained. Illustrations and graphs.

Books

3035 Fuel Oil Manual. Paul F. Schmidt. 160 pages. 1951. Industrial Press, New York. (TP355 Sch55f)

Concerned with fuel-oil selection, properties, handling, burning, troubles and remedies, together with working data for building heating, power generation, and industrial processes.

3036 Tekhnicheskii Analiz v Torfa. (Technical Analysis of Peat.) E. P. Semenskii. 171 pages. 1949. State Publishing House for Power Engineering Literature, Moscow and Leningrad, U.S.S.R. (TN840.R9 S52t)

Presents methods of laboratory investigation and describes methods of investigating of thermal and physical-mechanical properties of peat. Diagrams, tables, and graphs.

See also:
2834 (analysis of fuels—book)
3066 (utilization of peat in gas turbine)
3180 (coal as a fuel)
3207 (chemical propellants)
3218 (shale-oil production)
3756 (possible utilization of coal minerals)

20. HEATING, DRYING, AND AIR CONDITIONING

3037 Methods of Reducing Dust Emission From a Spreader-Stoker-Fired Boiler Furnace. W. C. Holton and R. B. Engdflahl. *Transactions of the American Society of Mechanical Engineers*, v. 74, Feb. 1952, p. 207-215; disc., p. 215-218.

Forty-seven tests were made on a continuous-ash-discharge spreader-stoker-fired boiler to determine means of reducing dust emission. In addition to burning rate, variables investigated were amount of overfire air; use of air, steam, and steam-air jets, location of steam jets; degree of reinjection used; and coal size.

3038* Pilot Scale Testing of Fuels Under Spreader Firing Conditions. W. G. Marskell, J. M. Miller and W. I. Joyce. *Fuel*, v. 31, Jan. 1952. p. 91-109.

A description is given of pilot-scale apparatus used to simulate combustion conditions of spreader-fired fuel beds. Spreader-firing equipment is briefly described and the correlation between pilot and full-scale spreader combustion outlined. Effects of variations in fuel composition and combustion-air supply are discussed.

3039 Self-Charging Electrostatic Air Filters. W. T. Van Orman and H. A. Endres. *Heating, Piping & Air Conditioning*, v. 24, Jan. 1952, p. 157-163.

The principle of electrical precipitation has been utilized for the efficient removal of highly dispersed particulate matter from atmospheric air. Certain high dielectric plastics, resins, and waxes exhibit this phenomenon and are being employed in air filters. Experimental service tests have been very favorable. Results are presented and discussed. 15 ref.

3040 Isothermal Ventilation-Jet Fundamentals. H. B. Nottage, J. G. Slaby, and W. P. Gojsza. *Heating, Piping & Air Conditioning*, v. 24, Jan. 1952, p. 165-176.

Presents fundamental findings from an experimental study of isothermal ventilation jets projected horizontally into a large confining space. Gives experimental procedure and results. Extensive graphical data. 15 ref.

3041 Warm-Air Perimeter Heating. Part II. Temperature Drop in Ducts Embedded in Concrete Floors. Part III. Heat Losses From Floor Slab. J. R. Jamieson, R. W. Roose, S. Konzo, and H. T. Gilkey. *Heating, Piping & Air Conditioning*, v. 24, Feb. 1952, p. 119-136.

Part 2 deals with the temperature distribution and heat emission of a concrete floor slab, heated by means of warm-air perimeter duct. Practical design curves are presented for estimating the temperature drop through 8-in. diam. imbedded ducts for various conditions of duct-air temperature, duct-air velocity, outdoor temperature and type of edge construction. In part 3, it is shown that of the 4 types of edge-construction studied, that which incorporated a 2-in.-thick, L-type, edge insulation was found to be most effective in reducing subfloor heat losses. Design values of the subfloor heat losses are presented for 2 types of edge construction. Heat-flow diagrams indicate the proportionate heat flow into the room, through the edge insulation, and into the ground, by-passing the insulation. A supplemental study of the durability of 9 materials for use as edge insulation was conducted.

3042 Warm Air Heating With Diffuser Outlets. John J. Albert. *Heating and Ventilating*, v. 49, Feb. 1952, p. 83-85.

Discusses the above giving construction principles. Describes results obtained from a number of installations in Conn. homes. Includes advantages and fuel consumption data.

3043* Boiling Coefficients Outside Horizontal Plain and Finned Tubes. John E. Myers and Donald L. Katz. *Refrigerating Engineering*, v. 60, Jan. 1952, p. 56-59.

Studies with Freon-12, CH_3Cl, SO_2 and C_3H_8 show that finned tubes have their maximum advantages at low temperature differences. Data are graphed.

3044* Elements of Efficiency in Lime Calcination. Irving Warner. *Rock Products*, v. 55, Jan. 1952, p. 137-138.

Discusses application of preheated combustion air, optimum air-fuel ratios, and high-level heat for improving firing efficiency of rotary kilns.

3045* Review of Work on Rotary Lime Kilns. Irving Warner. *Rock Products*, v. 55, Jan. 1952, p. 138-139, 195-197.

Discusses preheaters, internal refractory construction, and preheating the combustion air by regenerative cooling of the lime.

3046* Heat Pump Air Conditioner for Small Buildings. *Sheet Metal Worker*, v. 43, Jan. 1952, p. 100-101.

Describes a typical application and explains operating characteristics of interest to the warm-air heating contractor.

3047* The Austeel-Escher Recuperator. G. E. Walker. *Journal of the Society of Glass Technology* (News and Reviews Section), v. 35, Oct. 1951, p. 86-95.

Describes the above, for recovery of heat from glass furnaces, giving principles of design, and operating data.

Books

3048 Industrial Furnaces. Vol. 1. Ed. 4. W. Trinks. 526 pages. 1951. John Wiley & Sons, Inc., New York. (TN677 T73i4)

Includes data on the general description, uses and classification of furnaces, heating capacity, fuel economy, strength, and durability and movements of gases in furnaces.

See also:
3001 (coal-fired gas turbine)
3036 (fuel-oil combustion manual)
3094 (ceramic-firing furnaces)
3111 (solar furnace for melting refractories)

21. PRIME MOVERS

3049* The Viking Rocket. W. G. Purdy. *Aeronautical Engineering Review*, v. 11, Jan. 1952, p. 16-20.

Discusses the initial design considerations of the above. Operational test results are given.

3050* On the Interaction Between Multiple Jets and an Adjacent Surface. Julius Jonas. *Aeronautical Engineering Review*, v. 11, Jan. 1952, p. 21-25.

Concerned with over-heating of surfaces near the wake of the jet. A survey is made of existing theoretical and experimental investigations that, combined with original experimental investigations, point to the general design approach to be taken. 11 ref.

3051* Aircraft Nuclear Propulsion. M. C. Leverett. *Aeronautical Engineering Review*, v. 11, Jan. 1952, p. 29-33.

Discusses, within security limitations, the principles underlying nuclear powered flight, some possible methods of achieving it, and some problems involved.

3052 Celestial Guidance for Missiles. James G. Strong. *Aero Digest*, v. 64, Jan. 1952, p. 20-25.

Discusses possibilities and problems of the above.

3053 Jet Ignition Systems. L. J. Elliott. *Aero Digest*, v. 64, Feb. 1952, p. 28-32, 34, 36, 38, 42, 46, 48, 50.

Outlines in detail the steps in the development of the Bendix ignition system for jet engines. Numerous illustrations and diagrams.

3054 Afterburner. Robert McLarren. *Aero Digest*, v. 64, Feb. 1952, p. 60, 62-66, 68, 70, 72, 74, 76.

Describes the development of afterburner assemblies in turbojet engines. Applications to extremely high-speed fighters and missiles traveling at Mach numbers of 1-3 are discussed.

3055* Energy Characteristics of Combination Units With Mercury Turbines for Highly Efficient Generation of Heat. (In Russian.) M. L. Zaks. *Doklady Akademii Nauk SSSR*, new ser., v. 79, Aug. 1, 1951, p. 595-598.

A scheme of combining mercury turbines and steam turbines for the efficient use of high-temperature thermal energy was investigated theoretically. Results are discussed and charted.

3056 Quantitative Evaluation of Rocket Propellants. S. S. Penner. *American Journal of Physics*, v. 20, Jan. 1952, p. 26-31.

Describes a method for the above. The procedure utilizes the fact that adiabatic expansion through a nozzle may be considered to be isentropic. Treatments are presented for two limiting conditions of expansion. 12 ref.

3057* Aspects of Combustion Stability in Liquid Propellant Rocket Motors. Part II: Low Frequency Instability With Bipropellants. High Frequency Instability. L. Crocco. *Journal of the American Rocket Society*, v. 22, Jan.-Feb. 1952, p. 7-16.

In Part I, the problem of low-frequency combustion instability in monopropellant rocket motors had been analyzed under the basic assumption that the time lag is affected by pressure variations. The same idea is now applied to the bipropellant case. Using a simplified model for the spatial distribution of combustion in the chamber, the case of high-frequency instability is analyzed. The generalization of the results to real models is discussed.

3058* Rocket Propulsion Progress: A Literature Survey. G. P. Sutton. *Journal of the American Rocket Society*, v. 22, Jan.-Feb. 1952, p. 17-27, 31.

Presents a summary of technical progress achieved in the field of rocket propulsion as reflected in the published literature, and is also a guide to outstanding articles in the field. 6-page bibliography.

3059* Rocket Applications of the Cavitating Venturi. L. N. Randall. *Journal of the American Rocket Society*, v. 22, Jan.-Feb. 1952, p. 28-31.

The principles of operation and details of construction of above device are presented. Its development and application to liquid-propellant rockets are described. It has been employed extensively as a simple and accurate flow control. Its usefulness as a temperature device is also outlined, as are special forms designed to meet particular requirements.

3060* The Effects of Several Variables Upon the Ignition Lag of Hypergolic Fuels Oxidized by Nitric Acid. Stanley V. Gunn. *Journal of the American Rocket Society*, v. 22, Jan.-Feb. 1952, p. 33-38.

A method is described for measuring the above. Ignition-lag data are reported for combinations of HNO_3 with aniline, furfuryl alcohol, and mixtures of aniline and furfuryl alcohol. The ignition lags ranged from about 10 to about 400 millisec., depending upon such variables as temperature, acid composition, fuel composition, and metallic additives. 12 ref.

3061 Test Results With Dual-Fuel Carburetion at High Compression. J. C. Porter, A. P. McCloud ,and Richard Wiebe. *Automotive Industries*, v. 106, Jan. 15, 1952, p. 46-50, 86.

Presents results obtained both on the dynamometer and in road tests. Data are discussed and tabulated.

3062 Turbo Compound: Transport Fuel Saver. George L. Christian. *Aviation Week*, Feb. 18, 1952, p. 35-36, 39-40.

Describes the above engine introduced by Wright Aeronautical. It is essentially a standard reciprocating engine with an efficient power-recovery system. Secret of the engine's success is the blowdown turbine which absorbs energy from the exhaust without appreciably increasing back pressure.

3063 Air Research Extends Gas Turbine Field. George L. Christian. *Aviation Week*, v. 56, Jan. 21, 1952, p. 48-50, 52-53.

Describes developments in gas-turbine-powered aircraft pneumatic systems by AiResearch Corp. Highlights of the turbine system are listed. Cut-away illustrations.

3064* High Compression Spark Ignition Gas Engines. George Steven. *Diesel Power and Diesel Transportation*, v. 29, Dec. 1951, p. 52-56.

Covers background of development of high-compression spark-ignition engine. Discusses problems encountered. Gives examples and test data.

3065* Obtaining Pressure Diagrams of Internal-Combustion Engines. A. J. Cornish and W. P. Mansfield. *Engineering*, v. 172, Dec. 28, 1951, p. 806-810.

Gives details of electronic, recording apparatus for the above, and of procedures employed. Typical pressure diagrams are presented.

3066* Experimental Peat-Fired Gas Turbine. *Engineering*, v. 173, Jan. 4, 1952, p. 8-11.

Describes and diagrams the above. Details on the heating cycle are given.

3067* Air Intakes for Aircraft Gas Turbines. J. Seddon. *Engineering*, v. 173, Jan. 18, 1952, p. 94-96.

Discusses various factors affecting the above.

3068* Effect of Certain Metals and Metallic Oxides on the Decomposition of Peroxides. A. C. Egerton and B. D. Jain. *Fuel*, v. 31, Jan. 1952, p. 62-74.

Peroxides are formed during the combustion of hydrocarbons under conditions which conduce to "knock" in engines. The effect of lead tetraethyl, iron carbonyl, and other combustion inhibitors on the decomposition of H_2O_2 and of diethylperoxide was investigated. 11 ref.

3069* The Development of the DeHavilland Series of Engines for Light Aircraft. J. L. P. Brodie. *Institution of Mechanical Engineers, Proceedings*, Automobile Div., pt. 2, 1950-51, p. 48-57; disc., 58-67.

Deals with light airplane engine development over the last 25 years. Concentrates largely on designs, devoting a considerable proportion of the paper to the crankshaft. Compares steel and Al connecting rods. Illustrated.

3070 Rockets of the Navy. W. H. Keighley. *Ordnance*, v. 36, Jan.-Feb. 1952, p. 577-578.

Discusses present trend toward lightness and precision.

20. *Heating, Drying, and Air Conditioning*

3071* Now! Triple Automatic Extraction Turbines. J. M. Baker and E. V. Pollard. *Power*, v. 96, Feb. 1952, p. 91-93, 222, 224.

Describes and discusses the above. Diagrams and tables.

3072* Efficiency of Steam and Electric Locomotives. J. L. Koffman. *Railway Gazette*, v. 96, Jan. 18, 1952, p. 69-72.

Discusses factors affecting consumption of fuel and compares power output. Numerous graphs. 17 ref.

3073* Power Controls for Aircraft. C. F. Joy. *Journal of the Royal Aeronautical Society*, v. 56, Jan. 1952, p. 7-24.

Analyzes the above. Various types are diagrammed. 11 ref.

3074 Rate of Engine Wear Depends on Fuels & Lubes. *SAE Journal*, v. 60, Feb. 1952, p. 24-27. (Based on "Some Phenomena of Engine Wear as Revealed by the Radioactive Tracer Technique," H. R. Jackson, F. C. Burk, L. J. Test, and A. T. Cowell, to be published in *SAE Quarterly Transactions*.)

Recent radioactive-tracer tests on two single-cylinder laboratory engines indicate that: low-temperature wear increases in essentially a straight-line relationship with increasing S content in fuel in the range 0-0.25% S; as little as 1-2% alcohol in alcohol-gasoline blends results in a definite increase in low-temperature wear; and use of a properly compounded lubricant reduces wear at low operating temperatures.

3075 Gas Turbine Truck. Part I. Turbine Wheel Problem. *SAE Journal*, v. 60, Jan. 1952, p. 29-33. (Excerpts from "Progress of Gas Turbine Truck Tests," by Henry C. Hill.)

Discusses the difficulties that have been experienced with the turbine wheel during the tests; and developments which have been made to overcome these troubles.

3076 Gas Turbine Truck. Part II. General Test Results. *SAE Journal*, v. 60, Feb. 1952, p. 30-35. (Excerpts from "Progress of Gas Turbine Truck Tests," Henry C. Hill.)

Presents a summary of road testing and troubles encountered.

3077 New Technique Simplifies Evaluation of Precombustion Reactions. *SAE Journal*, v. 60, Feb. 1952, p. 50-55. (Excerpts from "Early Combustion Reactions," E. B. Rifkin, C. Walcutt, and G. W. Betker, Jr.)

The present study of precombustion reactions was carried out in 3 phases. In the 1st—an investigation of the precombustion properties of several hydrocarbons in the absence of an advancing flame front—ignition timing was set at 30° past top center. In the 2nd, a study of the behavior of fuels under more typical engine operating conditions was made. The 3rd phase was concerned with the relationship between precombustion reactions and power development over a range of ignition timings.

3078 Flight at the Borders of Space. Heinz Haber. *Scientific American*, v. 186, Feb. 1952, p. 20-23.

Discusses the problems of high-altitude flight.

3079 Research on a Highly Charged Diesel Engine. (In German.) G. Eichelberg and W. Pflaum. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93 Dec. 21, 1951, p. 1113-1123.

Discusses design and experimental results obtained with a diesel engine operated at a greater-than-normal intake rate of air and fuel. Results indicate an efficiency of about 45% at an operating pressure of 16 atm. Illustrations, graphs, and tables. 10 ref.

See also:

2847 (temperature measurement in internal-combustion engines)
2989 (locomotive air pollution)
3024 (antiknock additives for gasoline)
3026 (combustion properties of diesel fuels)
3031 (national motor-gasoline survey)
3126 (roller bearings for turbojet engines)
3127 (diesel-fuel ignition research)
3170 (automatic-transmission repair manual)
3207 (chemical propellants for jet propulsion)
3223 (sulfur compounds vs. tetraethyl lead efficiency)
3751 (nuclear power for industry)
3757 (engineering in nuclear energy development)

22. CERAMICS

3080 New Minerals for Ceramics and Conservation of Our Mineral Resources. Hewitt Wilson. *American Ceramic Society Bulletin*, v. 31, Jan. 1952, p. 4-9.

Surveys the above.

3081 Deterioration of the Surface of Sheet Glass. F. L. Bishop and F. W. Mowrey. *American Ceramic Society Bulletin*, v. 31, Jan. 1952, p. 13-15.

A brief review of causes of above variations is given. This is followed by some results of measurement of deterioration on surfaces having different treatments and different packing. Photomicrographs show typical surface defects.

3082 Limitations Imposed by Raw Materials on Firing Schedules. Gilbert C. Robinson. *Journal of the American Ceramic Society*, v. 35, Jan. 1, 1952, p. 1-5.

Raw material is the major factor in limiting speed of firing of ceramic materials when using tunnel kilns of small cross section. Raw materials vary greatly in the time required for water smoking, oxidation, and rapid shrinkage. Selection of materials and other means of reducing firing time are discussed. 11 ref.

3083 X-Ray Study of the Reactions at the Steel Surface When Titania Enamel Is Applied Directly. Gordon S. Douglas and Jason M. Zander. *Journal of the American Ceramic Society*, v. 35, Jan. 1, 1952, p. 5-11.

Presents results of detailed X-ray diffraction study of above reactions during firing of a titania enamel directly on steel. The theory that adherence depends on presence of an oxidizing agent in the enamel adjacent to the steel was applied and a correlation obtained on the assumption that dissolved TiO_2 is the adherence-promoting oxidizing agent.

3083a Islanding—A Surface Characteristic of Some Porcelain Enamels. M. K. Blanchard and W. A. Deringer. *Journal of the American Ceramic Society*, v. 35, Jan. 1, 1952, p. 12-15.

Observations made during an investigation of a porcelain-enamel surface characteristic called "islanding" are presented. The appearance and characteristic of islanded enamel surfaces are described and possible modes of formation considered. Results of corrosion tests on islanded and nonislanded surfaces are included to show the nonhomogeneity of some porcelain enamels.

3084 A Method for Determining Young's Modulus of Glass at Elevated Temperatures. D. A. McGraw. *Journal of the American Ceramic Society*, v. 35, Jan. 1, 1952, p. 22-27.

The method described is applicable from room temperature to 680 or 700°C. Data are presented for three soda-lime-silica glasses. 12 ref.

3085 A Preliminary Study of the Oxidation and Physical Properties of TiC-Base Cermets. Clinton C. McBride, Harold M. Greenhouse, and Thomas S. Shelvin. *Journal of the American Ceramic Society*, v. 35, Jan. 1, 1952, p. 28-32.

The TiC-base cermets investigated contained Cr, Fe, Co, Ni, NiAl, ferrosilicon, or Duriron as the metallic constituent. They were evaluated on the basis of strengths at 75 and 1800°F., oxidation resistance at 2000°F., and degree of chemical reaction between carbide and metal as determined metallographically. Metallographic and X-ray studies were conducted on the oxide layers to determine a qualitative mechanism of oxidation. Results indicate TiC plus NiAl to be the most promising composition, and oxygen diffusion to be the governing factor in the oxidation of the cermets studied.

3086 Fundamental Study of Clay: XII. A Note on the Effect of the Surface Tension of Water on the Plasticity of Clay. Bernard Schwartz. *Journal of the American Ceramic Society*, v. 35, Feb. 1, 1952, p. 41-43.

The effect of lowering the surface tension of water on the plasticity of a clay was evaluated from stress-strain diagrams. Results show that lowering the surface tension decreases the yield point, maximum strength, and workability of the plastic clay. A theoretical explanation for these phenomena is presented.

3087 Boron Carbide as a Base Material for a Cermet. H. J. Hamjian and W. G. Lidman. *Journal of the American Ceramic Society*, v. 35, Feb. 1, 1952, p. 44-48.

Describes an investigation conducted to determine the bonding mechanism in cermets after exposure at temperatures above the melting point of the metal. Experiments conducted with B carbide and each of 3 metals showed that Ni, Co, and Fe formed a bond between the metal and the ceramic. The properties evaluated were room and elevated temperature modulus of rupture, resistance to fracture by thermal shock, oxidation characteristics, and density. These properties were compared with those of hot-pressed B carbide. Photomicrographs.

3088 The Role of Titania in Silica Glasses. R. C. Turnbull and W. G. Lawrence. *Journal of the American Ceramic Society*, v. 35, Feb. 1, 1952, p. 48-53.

Describes a series of glasses in the system Na_2O-SiO_2-TiO_2. Density measurements and refractive indices were determined. Molar refractions of the various glasses were calculated using the Lorentz-Lorenz relationship. Graphs and tables. 14 ref.

3089 Low-Expansion Cordierite Porcelains. R. J. Beals and R. L. Cook. *Journal of the American Ceramic Society*, v. 35, Feb. 1, 1952, p. 53-57.

The crystalline nature and expansion characteristics of compositions in the region surrounding the cordierite area of the system MgO-Al_2O_3-SiO_2 were investigated. The selected compositions were fired to temperatures of 1250, 1300, 1350, and 1400°C., and thermal expansion characteristics were determined with the interferometer. Qualitative, as well as the quantitative, determination of crystalline constituents was made, utilizing strontium fluoride as an internal standard in the X-ray spectrometer. Includes tabulated data and phase diagrams.

3090 A Rapid Liquid-Phase Adsorption Method for the Determination of the Surface Area of Clays. Clyde Orr, Jr., and P. T. Bankston. *Journal of the American Ceramic Society*, v. 35, Feb. 1, 1952, p. 58-60.

A relatively simple, rapid, and reliable method for the above was developed. The liquid-phase adsorption of stearic acid was employed. The method should be of value in making predictions regarding properties such as total adsorptivity, coloring power, and catalytic activity. 22 ref.

3091 Standard Autoclave Test for Glazed Whiteware Products. John H. Koenig. *ASTM Bulletin*, Jan. 1952, p. 51-53.

Discusses the above. Presents a literature survey on various aspects of moisture expansion of glazes. 35 ref.

3092* Toughened Glass. H. D. Hendrick. *Automobile Engineer*, v. 42, Jan. 1952, p. 9-12.

Deals with the salient features of the above and describes in broad outline the manufacturing process used to obtain the special qualities desired.

3093* Selected Chapters From the Development of Fire Clay. (In German.) Artur Zwetsch. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Oct. 1951, p. 545-549; disc., p. 550.

Discusses effect of furnace system on formation of glazing cracks and flaking, dilatometric measurements, effect of cooling on the formation of cristobalite, factors that affect the formation of cristobalite, and structure formation in cast ware.

3094* Heat Balance of Ceramic Firing Furnaces. (In German.) E. Maase. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 28, Oct. 1951, p. 533-545.

Describes method of establishing the thermal economy of above furnaces and discusses factors that modify the results. Includes tables, charts, and graphs.

3095 Proper Pelletizing Technique—Key to Efficient Sintering of Aggregate. William C. Bell. *Brick & Clay Record*, v. 120, Jan. 1952, p. 46, 49, 52.

Shows that characteristics of different materials present individual pelletizing problems. Proper methods allow use of almost all types of clay to produce lightweight aggregate.

3096 Refractory Products With High Alumina Content, Using Synthetic Mullite. B. M. Pearson. *Ceramic Age*, v. 59, Jan. 1952, p. 44-45. (A condensation)

Presents a general review on the properties of the above.

3097 Know Separator Efficiency to Avoid Black Specking. J. T. Roberts. *Ceramic Industry*, v. 58, Feb. 1952, p. 66, 69.

Iron contamination, its detection and removal from enameling raw materials, are discussed. Magnetic separators are used. Data are tabulated.

3098 The Characteristics and Applications of Mixtures of Portland and High-Alumina Cements. T. D. Robson. *Chemistry & Industry*, Jan. 5, 1952, p. 2-7.

Presents and extends current knowledge of the above. Data on setting time and compressive strengths of mixtures of the cements are given. Graphs. 26 ref.

3099 The Use of Nepheline Syenite in Porcelain Enamels. John E. Cox and Ralph L. Cook. *Finish*, v. 9, Feb. 1952, p. 30-31.

Nepheline syenite was used in frits of conventional ground coat enamels and for low-temperature enamels. Compositions were studied to develop frits for the intermediate temperature range.

3100* The Dispersion and Thermo-Optic Behaviour of Vitreous Silica. S. Chandrasekhar. *Proceedings of the Indian Academy of Sciences*, v. 34, sec. A, Oct. 1951, p. 275-282.

Refractivity and the dispersion of vitreous silica are shown to be calcuable from those of quartz by considering the diminished density. Temperature variation of its refractive indices over the entire range of wavelengths is in quantitative accord with the hypothesis that the characteristic absorption frequencies in the ultraviolet fall with rise of temperature. Rate of change of these frequencies was traced from −160 to 1000°C. 12 ref.

3101 Industrial Furnace Insulating Refractories. J. D. Custer. *Industrial Heating*, v. 19, Jan. 1952, p. 127-128, 130, 132, 140.

Discusses insulating refractories for furnace linings. Includes conservation of fuel, heat penetration and storage, construction and weight of linings and selection of materials.

3102 New Refractories for Use Over 3000°F. O. J. Whittemore, Jr. *Industrial Heating*, v. 19, Jan. 1952, p. 134, 136, 138-140.

Discusses composition and effectiveness of the above. Table gives properties of new types.

3103* Various Experiments on Clay. (In Japanese.) Tamaki Watanabe. *Journal of Mechanical Laboratory*, v. 5, Sept. 1951, p. 231-234.

Presents results of experiments on the relationship of electrical resistance and plasticity of clays. Shows that the plasticity of clay is similar to that of metals. Graphs and diagrams.

3104* Properties of Zirconia and Lanthanum Oxide Base Ceramics. (In French.) Félix Trombe and Marc Foex. *Journal des Recherches du Centre National de la Recherche Scientifique*, no. 16, 1951, p. 1-8.

Various properties of the above were investigated, including phase equilibria, transformations, thermal-expansion properties, electrical resistivity, etc. 18 ref.

3105 An Apparatus for the Measurement of Small Differential Expansions and Its Use for the Study of Fused Silica. R. W. Douglas. *Journal of Scientific Instruments*, v. 29, Jan. 1952, p. 13-15.

The differential expansion is magnified by an optical lever, the sensitivity of which is increased by an arrangement of two graticules, the image of one acting as a vernier to the other. Changes of length of 10^{-8} cm. can be determined. The apparatus was used to measure differences in the thermal expansion of samples of fused silica which had been given different heat treatments.

3106 New Lithium Ceramics Have High Thermal Shock Resistance, Controlled Thermal Expansion, Chemical Resistance at High Temperatures. R. E. Stark and B. H. Dilks, Jr. *Materials & Methods*, v. 35, Jan. 1952, p. 98-99.

The above are based on aluminosilicate and are offered under trade name Stupalith. Gives information on properties and applications.

22. *Ceramics*

3107 Some Experiences in the Use of Chrome-Magnesite Refractories. G. Reginald Bashforth. *Metallurgia*, v. 45, Jan. 1952, p. 12-16.

Discusses the structure and constitution of the materials as related to performance in open-hearth steel making. Micrographs.

3108* Refractory Linings for Openhearth Furnaces. Comparative Factors Between Acid and Basic Linings. (In Italian.) A. Scortecci and F. Savioli. *Metallurgia Italiana*, v. 43, Dec. 1951, p. 521-525.

Discusses the 3 systems presently available: silica bricks with or without basic bricks for certain parts; quartzite tamped lining for everything except the arches; and all-basic linings. 23 ref.

3109 Adiabatic Thermal Changes in Barium Titanate Ceramic at Low Temperatures. Roland W. Schmitt. *Physical Review*, ser. 2, v. 85, Jan. 1, 1952, p. 1-4.

The above show a heating effect whether the electric field is applied or removed. Concludes from these results that the polarization process is thermodynamically irreversible. Quantitative results are given on temperature rise as a function of electric field strength and temperature.

3110* Permanente's Dust Nodulizing Process Effects Economies and Higher Output. P. S. Hass. *Pit and Quarry*, v. 44, Jan. 1952, p. 96-98, 101, 152, 164.

Procedure used in cement manufacture is described and clarified by a flow diagram. Equipment is illustrated.

3111 A Solar Furnace of 120 Inches Diameter for Studying Highly Refractory Substances. Willi M. Conn. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 945-951.

New developments in the design of the 120-in. solar furnace are discussed. Heating tests for obtaining molten materials, glasses, and products of crystallization are discussed. Methods are presented for work approximating black-body conditions at very high temperatures. A method for accurate determination of melting points of highly refractory samples under pure conditions is presented.

3112* Progress in Cement Manufacture. Bror Nordberg. *Rock Products*, v. 55, Jan. 1952, p. 110-121, 201-203.

Stresses developments of the industry from the point of view of technical progress and improved methods of production. Illustrations.

3113 Ceramics, Welding, Bonding Are Topics of Processing Panel H. W. Ingalls. *SAE Journal*, v. 60, Feb. 1952, p. 28-29, 38.

Reports on a panel discussion on processing of aircraft materials held at a SAE National Aeronautic meeting, Los Angeles, Oct. 2, 1951. Ceramic coatings, welding, and metal bonding were discussed in detail.

3114 Colouring Oxides in Vitreous Enamels. W. Ball. *Sheet Metal Industries*, v. 29, Jan. 1952, p. 79-82.

Discusses methods of firing, color making, frit composition, and color control. (To be continued.)

3115* Improvements in Glass Enamelling. F. E. Kerridge. *Journal of the Society of Glass Technology* (News and Reviews Section), v. 35, Oct. 1951, p. 96-112.

Discusses various enamelling processes, the firing operation, enamel compositions, and properties.

3116* The Surface Tension and Structure of Silicate Slags. T. B. King. *Journal of the Society of Glass Technology* (Transactions Section), v. 35, Oct. 1951, p. 241-259.

Presents experimental methods and general discussion of results of research on the above. 32 ref.

3117* The Thermal Conductivity of Glass Masses. (In Russian.) V. V. Rodnikova. *Steklo i Keramika*, v. 8, Mar. 1951, p. 9-12.

Temperature gradients and transmission of heat were measured in melts of various types of glass. Data are discussed, tabulated, and charted.

3118* The Properties of Non-Leaded Alkaline Pottery Glazes. (In Russian.) L. A. Plotnikov. *Steklo i Keramika*, v. 8, Mar. 1951, p. 12-16.

The influence of various amounts of different oxides on the fusibility of frits was investigated experimentally. Results are discussed, tabulated, and charted.

3119* Surface Energy as a Basic Factor in Volume Change in Thin Ceramic Bodies During Firing. (In Russian.) I. K. Matveev. *Steklo i Keramika*, v. 8, Mar. 1951, p. 17-20.

The above is treated theoretically using experimental data. Results are discussed and charted.

Miscellaneous Publications

3120 42nd Report of the Refractory Materials Joint Committee: 1950-51. T. F. E. Rhead, J. G. King, and A. J. Penston. Gas Research Board (England), Communication 62, 37 pages. (TP700 G21c)

Presents a movement survey on a battery of intermittent vertical retorts. Surveys the progress of other investigations on the Gas Research Board's program.

See also:

2533 (porcelain-enameled steel-hydrogen-caused defects)
2809 (analysis of glass-tank batches)
2832 (X-ray identification of clay minerals—book)
2952 (thermal analysis of clay minerals)
3047 (recovery of waste heat from small glass furnaces)
3418 (ceramics industrial piping)
3602 (magnetization of ceramic ferrites)
3636 (barium titanate transducers)
3650 (ceramic dielectric material)

23. LUBRICATION AND FRICTION

3121* Measuring the Lubricating Properties of Oils. (In German.) Heinz Glaubitz. *Archiv für Technisches Messen*, Dec. 1951, p. T137-T139. (6 p.)

Describes the most commonly used lubricating-oil testing machines. Photographs, graphs, and tables. 45 ref.

3122 The Stepped Shape Film Applied to a Journal Bearing. Frank R. Archibald. *Journal of the Franklin Institute*, v. 253, Jan. 1952, p. 21-28.

Shows how the stepped-film design suggested by Lord Rayleigh can be applied to the journal-bearing problem. Fairly simple explicit formulas were obtained for certain arrangements of this film shape.

3123* Rheological Studies and Electron Microscopy of Calcium Stearate-Cetane Gels. R. D. Vold, H. F. Coffer, and R. F. Baker. *Institute Spokesman*, v. 15, Jan. 1952, p. 9-16; disc., p. 17.

Contains data showing the yield value of above gels, often used in lubricating greases, as a function of time of mechanical working, starting with both quenched slow-cooled systems, and the effect of water content and aging on yield value. Electron micrographs show structural changes occurring as a result of working, hydration, and time.

3124 Lubrication of Railroad Motive Power. The Texas Company. *Lubrication*, v. 38, Feb. 1952, p. 13-24.

Discusses the above with respect to specific characteristics in accordance with design, means of application, and operating conditions. Covers road test and laboratory research.

3125 A Study of Rust Preventive Properties of Greases. R. J. Burger, B. Rubin, and E. M. Glass. *Lubrication Engineering*, v. 8, Feb. 1952, p. 21-23, 26-27, 46.

Describes a laboratory procedure using ball bearings which showed good correlation with service results. The investigation included petroleum, diester, Ucon oil, and silicone greases. Several factors influencing the degree of corrosion resistance were investigated. The effect of rust inhibition was noted.

3126 High-Speed Roller Bearings. E. F. Macks, Z. N. Nemeth, and W. J. Anderson. *Machine Design*, v. 24, Jan. 1952, p. 214, 216-218, 220, 222.

Discusses the above used in turbojet engines. Comparisons are made with the hydrodynamic bearing. Gives results and an

analysis of tests on bearing speed, load, cage design, oil flow and oil inlet temperature, velocity, viscosity, and distribution.

3127 Microscopes and Greases. Arch L. Foster. *Petroleum Engineer*, v. 24, Feb. 1952, p. C3-C4.

Discusses study of the structure and behavior of lubricating greases. Includes discussion of diesel-fuel ignition research.

3128 Electron Microscope Study of Lithium Greases. John A. Brown, Charles N. Hudson, and Lewis D. Loring. *Petroleum Engineer*, v. 24, Feb. 1952, p. C31-C36.

Gives relationship between composition of greases, and their performance when worked and in service. Includes detailed information on structure, optical birefringence, orientation, composition variables, effect of temperature and oxidation, and breakdown of fiber structure with mechanical work. 20 photomicrographs of Li greases made by different methods. 15 ref.

3129 1000-Mile Oil Change Is a Must. W. F. Weiland. *Petroleum Processing*, v. 7, Jan. 1952, p. 69, 71, 73, 74-75.

Presents results of tests on lube stability vs. corrosion of engine and bearing metals. They show that incipient corrosion is definitely related to an acid-vapor temperature of 215°F. or the temperature at which vapors with acid characteristics are liberated in progressive oil breakdown.

3130* Residual Fuel Oil Additives Can Be Effective. E. W. Jerger. *Plant*, v. 5, Feb. 1952, p. 44-45.

Discusses what such additives can be expected to accomplish; their chief target, sludge; mandatory properties; chemicals utilized; and when such products should be added to the oil.

3131 Sleeve Bearings—Design, Manufacture and Installation. Richard J. Schager. *SAE Quarterly Transactions*, v. 6, Jan. 1952, p. 165-174.

Materials, design features, installation, and manufacture of sleeve bearings are discussed. Includes micrographs, macrographs, diagrams, and graphs. Emphasis is on pertinent mechanical properties and corrosion resistance of the various bearing metals and alloys.

3132* Influence of Bearing Design Upon Load Carrying Capacity and Operational Safety of Bearings. (In German.) Alfred Buske. *Stahl und Eisen*, v. 71, Dec. 1951, p. 1420-1432; disc., p. 1432-1433.

Oil-film pressure and temperature were determined in bearing-test machines with bearings of different design characterized by variation in rigidity of the bearing body and the bushing. Describes effects of modulus of elasticity of the bearing materials. Numerous diagrams, graphs, and illustrations.

3133* Gear-Wheel Research and Lubricants. (In German.) E. Heidebroek. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93, Nov. 11, 1951, p. 1012-1014.

Reports on investigations concerning the oil film and its influence on friction processes. The lack of a uniform lubricant of controllable properties makes comparison with other research difficult. Details of investigations are indicated; results are discussed.

3134* The Floating Bearing as a Low-Friction Precision Bearing. (In German.) F. Gottwald and A. Wesp. *Zeitschrift für angewandte Physik*, v. 3, Sept. 1951, p. 345-348.

Diagrams and calculates the theory of above type of bearing. In case of low speeds, the friction is considerably decreased if the outer ring of the bearing is allowed to rotate. Agreement of calculation and experiment are indicated.

Books

3135 Nemetallicheskie Podshipniki Skol'zheniia. (Nonmetallic Sliding Bearings). D. M. Khait. 121 pages. 1949. State Scientific-Technical Publishing House for Mechanical-Engineering Literature, Moscow, U.S.S.R. (TJ1061 K52n)

Describes properties and structures of plastic materials used for non-metallic bearings, special characteristics of design and production, and conditions of use and applications of such bearings. Tables, graphs, and diagrams. 66 ref.

See also:
3004 (filtration of lubricants)
3074 (lubricant effects on engine wear)

24. DESIGN

3136* The Interpretation of Failure Loads in the Plastic Theory of Continuous Beams and Frames. P. S. Symonds and B. G. Neal. *Journal of the Aeronautical Sciences*, v. 19, Jan. 1952, p. 15-22.

Deflection values are calculated by a simple approximate method. Results are compared with those previously published. The method may be used for general framed structures, and an analysis of a 2-story portal frame is given as an illustration. 13 ref.

3137* Column Behavior Under Conditions of Impact. George Gerard and Herbert Becker. *Journal of the Aeronautical Sciences*, v. 19, Jan. 1952, p. 58-60.

The magnitude of the stress introduced into a long slender bar by velocity impact depends only upon the conditions of impact. Column behavior under impact was studied theoretically and by a novel experimental technique. It is concluded that a column can momentarily support a dynamic compressive stress of any magnitude which may be introduced by impact.

3138* Photoelasticity and Aircraft Design. H. T. Jessop and C. Snell. *Aeronautical Quarterly*, v. 3, pt. 3, Nov. 1951, p. 161-172.

The investigation described shows the capabilities of the photoelastic method in obtaining information as to the stress distribution in specific components. The abnormally high sensitivity to fatigue shown by some of the new light alloys makes it especially necessary for the aircraft designer to know the magnitudes of the stress concentrations in all components.

3139* A Note on the Design of Ducted Fans. Bryan Thwaites. *Aeronautical Quarterly*, v. 3, pt. 3, Nov. 1951, p. 173-181.

Mathematical analysis with worked example.

3140* Beams on Cross-Girders With Clamped Ends. J. M. Klitchieff. *Aeronautical Quarterly*, v. 3, pt. 3, Nov. 1951, p. 230-237.

Mathematical analysis of stresses in the above.

3141 Metal Honeycomb Replaces Ribs, Stringers. *Aviation Week*, v. 56, Jan. 28, 1952, p. 41, 44.

In Northrop high-speed airplanes aluminum (3SH) honeycomb core material is being substituted for the conventional rib and stringer makeup of control surfaces. It combines high-strength-weight and stiffness-weight characteristics.

3142* Substitutes for Scarce Materials in Spring Design. Frank A. Votta, Jr. *Electrical Manufacturing*, v. 49, Feb. 1952, p. 116-119, 268, 270.

Discusses characteristics of various materials which can be used as substitutes for Type 302 stainless steel and phosphor bronze. Includes mechanical properties.

3143* Elastic Stress Analysis of Multi-Bay Single-Story Frameworks. E. H. Bateman. *Engineering*, v. 172, Dec. 21, 1951, p. 772-774; Dec. 28, 1951, p. 804-806.

Mathematical analysis.

3144* Thermal Stresses in a Rotating Elastic Solid of Revolution. C. E. Iliffe. *Engineer*, v. 192, Dec. 28, 1951, p. 835-836.

A mathematical treatment.

3145* Uniform Calculations for Heat Exchangers. (In German.) F. Bosniakovic, M. Vilicic, and B. Slipcevic. VDI-Forschungsheft 432. (Supplement to *Forschung auf dem Gebiete des Ingenieurwesens*, v. 17, sec. B, 1951), p. 5-26.

Mathematical analysis and graphical interpretation.

3146* The Turbulent Flow Angle of Fuels in Nozzles During Continuous Injection. (In German.) E. Söhngen and U. Grigull. *Forschung auf dem Gebiete des Ingenieurwesens*, sec. B, v. 17, no. 3, 1951, p. 77-82.

Reports on measurements of flow angles, and rate and pressure of fuel. Turbulence-producing fuel-injection nozzles were in-

24. *Design*

vestigated. Results are compared with mathematical ones from "frictionless" nozzles. Includes diagrams, tables, and graphs.

3147* Use of Wire-Resistance Strain-Gauges in Automobile Engineering Research, With Particular Reference to the Measurement of Strain in Vehicle Structures. J. R. Bristow, P. Metcalf, and C. H. G. Mills. *Institution of Mechanical Engineers, Proceedings,* Automobile Div., pt. 2, 1950-51, p. 27-37; disc., 37-47.

A brief description is given of the properties and method of use of the above, indicating their sphere of usefulness and limitations, and factors affecting accuracy and stability. Determination of static strain, using a simple bridge and galvanometer method, is illustrated. Dynamic strain determination is discussed with reference to measurements made on the frame and superstructure of a double-deck public service vehicle under road conditions. Typical strain records are given.

3148* Pipe Joints for Hydraulic Power Transmission. B. Cooke. *Institution of Mechanical Engineers, Proceedings,* v. 164, no. 3, 1951, p. 308-314; disc., 315-323.

Describes tests carried out on a variety of pipe joints, in an attempt to find a satisfactory one. In the absence of quantitive data, a joint and joint-ring were designed from the results of the tests. Diagrammed and illustrated.

3149 Turbine Governors As Related to Pneumatic Controls. J. A. Pellettere. *Instruments,* v. 25, Jan. 1952, p. 92-95; *ISA Journal,* v. 8, Jan. 1952, p. 2-5.

Surveys the types of governors and their characteristics. Outlines advantages of an ideal governor.

3150* Conservation of Steel by Design. O. W. Irwin. *Journal of the American Concrete Institute,* v. 23, Jan. 1952; *ACI Proceedings,* v. 48, 1952; p. 373-378.

Deals with suggestions for saving steel in reinforced concrete design. Refers to inconsistencies in steel stresses and recommends that tensile unit stress be 60% of the minimum yield point.

3151 Determining Natural Vibration Period of Compound-Section Cantilever Beams. W. A. Thomas. *Machine Design,* v. 24, Jan. 1952, p. 115-117.

In designing machines of various types, it is often necessary to determine the vibration period of a part in the form of cantilever beam. A direct general formula is developed to aid in calculating the vibration period of the 3-step beam. It may be easily extended to cover cantilever beams having more than 3 different cross sections.

3152 Thread Locking With Plastics. S. S. Stivala. *Machine Design,* v. 24, Feb. 1952, p. 127-131.

Presents an analysis of the investigation which led to the development of certain polyester materials for thread sealing and locking. As a condensed guide for the practical use of design engineers, key information on the use of polyesters as thread sealers is presented in an appendix.

3153 Mechanisms for Intermittent Motion. Part 3. Otto Lichwitz. *Machine Design,* v. 24, Feb. 1952, p. 146-155.

Discusses internal star-wheel mechanisms. Includes design considerations and properties.

3154 Micromotion Pictures. How They Can Aid in the Design of Machines. G. H. Gustat. *Machine Design,* v. 24, Jan. 1952, p. 148-150.

Motion pictures taken at a constant speed of 1000 frames per minute make it possible to determine the length of time it takes to perform any given motion or series of motions. New operations are synthesized by using manual motions in various combinations with a special jig or improvised machine. Estimated cost of performing the operation by machine is determined. By comparing existing and estimated production costs, it is possible to determine whether or not further design effort is worthwhile.

3155 Charts Simplify Flywheel Calculations. Harold M. Durham. *Machine Design,* v. 24, Jan. 1952, p. 151-158.

Some of the fundamental aspects of design for flywheels are briefly reviewed, and simplified calculation procedures are presented for several types of problems that arise in the determination of flywheel proportions. Diagrams.

3156 Flat-Wound Tension Springs. R. M. Conklin and D. R. Forry. *Machine Design,* v. 24, Jan. 1952, p. 159-161.

Provides the designer with easily applied formulas and a nomogram which will quickly and easily permit him to determine the applicability of the flat-wound spring to a design problem.

3157 Beam Deflection. W. L. Tryon. *Machine Design,* v. 24, Feb. 1952, p. 161-171.

Presents charts giving deflection data rapidly for most of common beam types. These solutions include many that are needed in dealing with shafts of rotating machines; bars or elements subjected to centrifugal force; and, in general, structural parts requiring critical analysis of deflection.

3158* Pipe and Fittings for Industrial Hydraulic Systems. George N. Dorr. *Machinery* (American), v. 58, Feb. 1952, p. 170-175.

Describes various types of valves, transmission lines, and fittings commonly used in hydraulic systems, and some of the factors to be considered in selecting and using them.

3159 Hydraulic Noise Reduction by Piston Pump Modification. G. W. Louthan. *Product Engineering,* v. 23, Feb. 1952, p. 178-182.

Discussion and mathematical analysis of the above. Diagrams and illustrations. (To be continued.)

3160 Using the Patent Office Files as a Design Source. Charles E. Balleisen. *Product Engineering,* v. 23, Feb. 1952, p. 191-193.

Gives pertinent information to aid in understanding the system used by the Patent Office in filing and indexing its material.

3161 Design Charts for Large Compression Springs. *Product Engineering,* v. 23, Feb. 1952, p. 203, 205, 207.

3162 A Simplified Constant Shear Stress Lever for Creep Tests on Single Crystals. M. Metzger. *Review of Scientific Instruments,* v. 22, Dec. 1951, p. 1022-1023.

A theoretical analysis. Suitable apparatus is diagrammed.

3163 Nomograph for Determining Maximum Tensile Strees in Snap Rings. Leonard M. Majeske. *Tool Engineer,* v. 28, Feb. 1952, p. 49.

Applicable to steel rings used either externally on shafts or internally in housings.

3164* The Strength of Hollow Bodies Under the Influence of High Temperature and Pressure, With Particular Emphasis on Very-High Pressure Lamps. (In German.) J. Kern. *Zeitschrift für angewandte Physik,* v. 3, Sept. 1951, p. 321-329.

Discusses and calculates the elastic stresses in hollow spheres and cylinders. Proposes a formula for the best possible relationship between pressure, heat, properties of the material and dimensions in hollow spheres. Results are applied to above examples.

Miscellaneous Publications

3165 Buckling of Rectangular Sandwich Plates Subjected to Edgewise Compression With Loaded Edges Simply Supported and Unloaded Edges Clamped. Kuo Tai Yen, V. L. Salerno, and N. J. Hoff. National Advisory Committee for Aeronautics, Technical Note 2556, Jan. 1952, 66 pages. (TL570 Un3t)

A mathematical treatment. 12 ref.

3166 Compressive Buckling of Simply Supported Curved Plates and Cylinders of Sandwich Construction. Manuel Stein and J. Mayers. National Advisory Committee for Aeronautics, Technical Note 2601, Jan. 1952, 34 pages. (TL570 Un3t)

Two types of the above, the corrugated-core and the isotropic-core type, were investigated. Solutions are obtained from a theory for orthotropic curved plates in which deflections due to shear are taken into account. Results are given in the form of equations and curves.

Books

3167 Pile Foundations; Theory, Design, Practice. Ed. 1. Robert D. Chellis. 681 pages. 1951. McGraw-Hill, New York. (TA780 C41p)

Provides, in one source, the information required for the design, driving, and maintenance of pile foundations. Describes pile-foundation failures of 60 actual cases, with causes, methods of prevention, and remedies. Standard specifications of leading technical societies and associations, and of leading manufacturers of piles and piling contractors, are given. Numerous figures and photographs.

3168 Cams and Springs for Poppet Valves. W. H. Lee. 42 pages. 1950. Emmott & Co., Ltd., Manchester, England. (TJ789 L51c)

Provides a collection of data whereby the nature and intensity of the forces generated by the cam and the characteristics of the spring to control them may be accurately computed.

3169 Pressure Vessels. William Buchan Ritchie. 71 pages. 1950. Emmott & Co., Manchester, England. (TS283 R51p)

Draws attention to the legal, moral, and financial responsibilities concerned with the design, manufacture, and use of pressure vessels having an explosion or implosion potential. By correlating the different aspects, provides a realistic approach to the fundamentals involved.

3170 Automatic Transmissions. W. K. Toboldt, C. Ray Strouse, and William J. Williams. 248 pages. 1951. Laurel Publishers, Scranton, Pa. (TL260 T55a)

The above was written especially for the automotive repairman who has to know the complete details and construction of the new automatic transmissions. Covers construction, servicing, and trouble-shooting.

See also:
2448 (design of gray-iron castings)
2686 (design of steel bridges)
2691 (application of fatigue data to steel design)
3683 (electronic "flip-flop" as machine element)

25. CHEMICAL TECHNOLOGY

3171* Simple Means of Emulsification. (In Russian.) L. Ia., Kreminev. *Doklady Akademii Nauk SSSR*, new ser., v. 79, Aug. 1, 1951, p. 655-657.

A rapid and simple method of forming stable emulsions was developed. Results are discussed and tabulated.

3172 Studies on Lignin and Related Products. VII. The Isolation of Certain Compounds From Lignin Oxidation Mixtures by Chromatographic Techniques. Irwin A. Pear and Edgar E. Dickey. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 614-617.

Describes the use of adsorption chromatographic techniques for the separation and isolation of a number of compounds from the bisulfite-soluble and alkali-soluble fractions of an alkaline cupric oxide-lignosulfonate reaction mixture. 10 ref.

3173 Effect of Winterization on the Composition and Stability of Cottonseed Oil. C. H. Mack, R. N. Moore, and W. G. Bickford. *Journal of the American Oil Chemists' Society*, v. 29, Jan. 1952, p. 14-16.

The relationship between tocopherol content, fatty-acid composition, and autoxidative stability was investigated for a series of 3 cottonseed oils representing a commercially refined and bleached oil, the same oil after winterization, and the corresponding stearine press cake. 14 ref.

3174 Cottonseed and Peanut Meal Glues. Resistance of Plywood Bonds to Chemical Reagents. Joseph T. Hogan and Jett C. Arthur, Jr. *Journal of the American Oil Chemists' Society*, v. 29, Jan. 1952, p. 16-18.

Test results on the above suggest that the principal attractive forces involved in the protein bonds were ionic or valence forces and that differences observed in the resistance of the glues to chemical reagents were probably due to variations in the amino-acid constitution of the proteins.

3175 Spaced Spiral Weave Metallic Cloth as a Column Packing Material for Stripping Soybean Oil. Lionel K. Arnold and Robert D. Ingebo. *Journal of the American Oil Chemists' Society*, v. 29, Jan. 1952, p. 23-28.

A study of the effect of liquid distribution on the performance of a packed column resulted in development of a distributor head for feeding which not only improved distribution but decreased steam consumption by about 20% and increased the column capacity by about 30% in above process. Liquid distribution studies showed that these units maintained a very uniform distribution of liquid.

3176* Pilot Plant Desolventization of Fine Cottonseed Meal. A. V. Graci, Jr., H. K. Gardner, A. F. Cucullu, A. J. Crovetto, Jr., J. J. Spadaro, and N. B. Knoepfler. *Journal of the American Oil Chemists' Society*, v. 29, Feb. 1952, p. 41-43.

Describes the above process. Lists data showing gossypol content and protein solubility before and after desolventization. 12 ref.

3177* Relation Between Fatty Acid Composition and Iodine Value of Cottonseed Oil. Mack F. Stansbury and Carroll L. Hoffpauir. *Journal of the American Oil Chemists' Society*, v. 29, Feb. 1952, p. 53-55.

Reports compositional data on 48 cottonseed oils and correlates the percentages of the fatty acids present with the iodine values, providing a basis for approximating the fatty-acid composition of a cottonseed oil from its iodine value. 10 ref.

3178* Re-Refining Cottonseed Oil at High Rates of Shear. J. G. Kroonen and R. O. Feuge. *Journal of the American Oil Chemists' Society*, v. 29, Feb. 1952, p. 65-71.

Discusses application of high rates of agitation and shear in re-refining caustic-soda-refined cottonseed oils, and effects produced by the systematic variation of factors involved in the process as applied to oils of widely divergent origins. Compares oils re-refined by normal and high-shear methods.

3179* Sealing Strength of Waxed Papers. R. G. Capell, W. P. Ridenour, and P. R. Templin. *American Paper Converter*, v. 26, Feb. 1952, p. 12-13, 56-57, 59.

The nature of the heat seal and of a number of variables, including fiber orientation, oil content, effect of inks, sealing and testing temperature, aging, and stiffness, are discussed. Tables and graphs. 10 ref.

3180 Plate-Efficiency Correlation in Distilling Columns and Gas Absorbers. Ju Chin Chu, J. Richard Donovan, B. Clifford Bosewell and L. Charles Furmeister. *Journal of Applied Chemistry*, v. 1, Dec. 1951, p. 529-541.

Two methods are developed for the above. The first method, which is the more rigorous, deals with correlation of local Murphree plate efficiency, and a final working formula is derived. The second correlates overall plate efficiency of fractionating columns with L/V ratio, effective submergence, relative volatility of key components, and viscosity of the feed. 34 ref.

3181* Coal Invades New Fields of Utilisation. *B.C.U.R.A. Quarterly Gazette*, no. 14, 1951, p. 8-14.

Discusses coal as a fuel, and as a chemical. Includes properties, choice of solvents, applications, products, and economic aspects.

3182 Industrial Oxygen: Make It or Buy It? *Business Week*, Feb. 16, 1952, p. 65-66, 68.

Describes and gives advantages of the Joy Mfg. Co. oxygen generating apparatus. It is said that industrial oxygen users can save 60-85% of their direct costs by making O_2 in their own plants with this equipment.

3183 Radioisotopes Spearhead Chemical Development. G. H. Guest. *Canadian Chemical Processing*, v. 36, Jan. 1952, p. 82-85.

Presents a general survey of the above.

3184 Deterioration of Cracking Catalysts. *Chemical Age*, v. 66, Jan. 26, 1952, p. 173-174.

Discuses various factors in the above.

3185 Control Methods for a Batch Process. Theodore R. Olive. *Chemical Engineering*, v. 59, Jan. 1952, p. 140-144.

Describes Ehret Magnesia Mfg. Co.'s new magnesia insulation plant which contains many good ideas of use in control of

25. *Chemical Technology*

batch processes. The plant successfully integrates remote manual control, automatic weight, materials handling, and time-cycle control. Illustrations and diagrams.

3186 Finned Tubes Find Process Uses. L. C. Johnston. *Chemical Engineering*, v. 59, Jan. 1952, p. 148-149.

Points out the advantages and disadvantages of the above in chemical engineering, with the dual object of preventing their misapplication where unsuited and encouraging their use where desirable.

3187 Why the Furfural Freshet? *Chemical Engineering*, v. 59, Jan. 1952, p. 217-218.

Discusses the principal uses of furfural and indicates future developments.

3188 Speed Up Cold Rubber Output. *Chemical Engineering*, v. 59, Jan. 1952, p. 220.

Describes simple new cooling set-up which cuts cold rubber reaction to 11 hrs., increases capacity 20%. Phillips Chemical Co. aims at 7-hr. reaction, an 80% capacity hike.

3189 New Way to Separate Liquids. *Chemical Engineering*, v. 59, Jan. 1952, p. 222, 224-226.

Describes how liquid thermal diffusion, defying mass theory, separates liquids of the same molecular weight or identical boiling point. Future commercial prospects are discussed.

3190 A Radical Tack in Salt Making. *Chemical Engineering*, v. 59, Jan. 1952, p. 230, 232, 234.

New technique uses vapor recompression cycle with a simple, single-effect evaporator. Results: For the first time, an efficient, low-cost, small-package salt refinery.

3191 Fauser Process Improved. *Chemical Engineering*, v. 59, Jan. 1952, p. 238.

Describes continuous process for the direct manufacture of 98% HNO_3. Demand by the explosive industry and its use in rocket fuels are factors responsible for interest in the process.

3192 Drying Air in a Fixed Bed: Can Calculations Be Made? D. C. Eagleton and Harding Bliss. *Chemical Engineering*, v. 59, Jan. 1952, p. 322, 324-326.

Tells how a mathematical solution for the above was derived.

3193 Industrial Utilization of Carbohydrates. *Chemical and Engineering News*, v. 30, Feb. 11, 1952, p. 506-517.

Three separate articles discuss problems, possibilities, and future prospects: "Industrial Sugar Research," Sidney M. Cantor; "Industrial Cellulose Research," Wendell W. Moyer; "Industrial Starch Research," C. G. Caldwell.

3194 Applications of Fluid Mechanics and Similitude to Scale-up Problems. Part I. J. H. Rushton. *Chemical Engineering Progress* (Engineering Section), v. 48, Jan. 1952, p. 33-38.

A brief review of the principles of dynamic similitude is given. Basic concepts of fluid mechanics are used to develop relations between fluid motion, equipment size, and fluid properties that may apply to chemical engineering work. A general method is given whereby the requirements for dynamic similitude for any flowing system can be determined. Examples are given showing how these principles can be used in pilot-plant models. (To be continued.)

3195* Steam-Jet Ejector Vacuum Cooling Systems for Crystallizing Apparatus. (In German.) H. Hammer, T. Messing, and H. Schunck. *Chemie-Ingenieur-Technik*, v. 23, Nov. 14, 1951, p. 513-516.

Describes briefly design and use of above and outlines mathematically a general method of computing energy consumption. Diagrams, graphs, and tables are presented.

3196* Desulfurization of Gases With the Aid of Ammonia. (In German.) Fritz Rosendahl. *Chemie-Ingenieur-Technik*, v. 23, Dec. 21, 1951, p. 578-579.

Procedure for the above is described and a proposed desulfurizing plant is described and diagrammed. Data are tabulated.

3197 Chemical Engineering Unit Operations. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 21-94.

Annual review series covers same topics as last year, except for Drying and High Vacuum Distillation. Topics are: "Absorption and Humidification," R. L. Pigford; "Adsorption," B. L. Harris; "Centrifugation," James O. Maloney; "Crystallization," C. S. Grove, Jr., and Joseph B Gray; "High Temperature Distillation," T. J. Walsh; "Evaporation," W. L. Badger and R. A. Lindsay; "Solvent Extraction," Robert E. Treybal; "Filtration," Shelby A. Miller; "Fluid Dynamics," Max Leva and Murray Weintraub; "Heat Transfer," George T. Skaperdas; "Ion Exchange," Robert Kunin; "Materials Handling," Richard L. Speaker; "Mixing," J. Henry Rushton; and "Size Reduction," Lincoln T. Work.

3198 By-Products of the Thiophene Synthesis. Philip D. Caesar and Peter D. Branton. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 122-125.

3-thiophenethiol was identified and made potentially available in quantities of about 1 lb. per 4 lbs. of thiophene. A second compound was isolated and tentatively identified as 3,4-thiolanedithione. In all, about 40% of the by-product material was converted into useful products. Practical significance of this work is the description of a possible large-scale source of two new and versatile compounds of high sulfur content. 21 ref.

3199 Asphalt, a Colloidal Material. R. N. Traxler and J. W. Romberg. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 155-158.

An investigation was made to correlate source variation in physical properties with colloidal characteristics. Solubilities in organic solvents, microscopical examination, rheological properties, and dispersion and flocculation of asphaltenes by petrolenes were employed to distinguish between asphalts of different colloidal characteristics. Data are presented which show that correlations exist between the colloidal characteristics of representative asphalts and physical properties that determine usefulness in service. 17 ref.

3200 Gas Mixing in Beds of Fluidized Solids. E. R. Gilliland and E. A. Mason. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 218-224.

Pattern of gas flow in small fluidized beds was investigated by means of helium tracer technique. Small glass beads and petroleum microsphere catalysts were employed as solids. Two types of experiments involved measurements of back mixing and residence time of the gas in the bed.

3201 Compound Fertilizers From Rock Phosphate, Nitric and Sulfuric Acids, and Ammonia. M. M. Striplin, Jr., David McKnight, and T. P. Hignett. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 236-242.

As part of its program to develop improved and/or lower cost fertilizers, TVA for several years has been developing compound fertilizers by processes that involve acidulation of rock phosphate with HNO_3. Describes one of these processes which consists in treating rock phosphate with a mixture of HNO_3 and H_2SO_4, ammoniating the acidulate, and then drying. KCl may be added during processing to produce a granular, homogeneous N-P-K fertilizer.

3202 Rate of Isomerization of Cyclohexane; Effect of Aluminum Chloride and Hydrogen Chloride. A. P. Lien, E. L. d'Ouville, B. L. Evering, and H. M. Grubb. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 351-353.

The above was investigated, using commercial reagents which would be available for large-scale industrial applications. The equilibrium between cyclohexane and methylcyclopentane was determined at several temperatures and the effect of hydrogen pressure on reaction rate was investigated. 17 ref.

3203 Fischer-Tropsch Synthesis; Some Important Variables of the Synthesis on Iron Catalysts. R. B. Anderson, B. Seligman, J. F. Shultz, R. Kelly, and M. A. Elliott. **Effect of Nitriding on Three Types of Iron Catalysts.** J. F. Schultz, B. Seligman, L. Shaw and R. B. Anderson. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 391-401.

21 references.

3204 Statistical Methods in the Chemical Industry. O. L. Davis. *Industrial Chemist and Chemical Manufacturer*, v. 28, Jan. 1952, p. 7-10.

Discusses the contribution which statistical methods can make to the planning of experiments relating to chemical-manufacturing processes. (To be continued.)

3205 Performance of a Packed Liquid-Liquid Extraction Column Under Controlled Agitation. George Feick and Harry M. Anderson. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 404-409.

Surveys the above. Data are graphed and tabulated. 17 ref.

3206* Sulphuric Acid and Cement From Anhydrite. *International Chemical Engineering & Process Industries*, v. 33, Jan. 1952, p. 35-36.

Presents process details on the above.

3207 Chemical Propellants. S. S. Penner. *Journal of Chemical Education*, v. 29, Jan. 1952, p. 37-39.

An elementary survey of the above, actually or potentially applicable in jet propulsion.

3208* Handling and Treatment of Pulp and Paper Mill Wastes. W. A. Moggio. *Journal of Southern Research*, v. 4, Jan.-Feb. 1952, p. 14-16.

Discusses waste handling and treatment from both the kraft and semi-chemical process. Includes by-product recovery.

3209 Fluids for Hydraulic Systems: The Basic Types and Where to Use Them. Kenneth Rose. *Materials & Methods*, v. 35, Jan. 1952, p. 100-102.

3210* Zinc Oxide Manufacture in Germany. C. W. Jensen. *Mining Magazine*, v. 106, Jan. 1952, p. 15-21.

A review of direct and indirect methods used to supply the pigment industry.

3211* Evaluation of Waxed-Paper Seals. John W. Padgett, E. A. Yermakoff, and S. T. Van Esselstyn. *Modern Packaging*, v. 25, Feb. 1952, p. 121-129.

Surveys various known methods for determining the adhesion properties of micro-crystalline wax. Describes a method primarily developed to eliminate the air spaces which form between the sealed sheets.

3212* Penzoil Carries Propane Fractionation to Advanced New Stage. George Weber. *Oil and Gas Journal*, v. 50, Jan. 21, 1952, p. 78-79, 109-110.

Description of techniques and apparatus used at Rouseville, Pa., plant includes flow diagram and illustrations.

3213* New Treating Process. George Weber. *Oil and Gas Journal*, v. 50, Feb. 4, 1952, p. 38-39.

Describes a new technique involving the use of formaldehyde as a refining agent for cracked and virgin gasoline stocks.

3214 Oil Shale As a Fuel Resource. Clyde Berg. *Petroleum Engineer*, v. 24, Jan. 1952, p. A37-A43.

Reviews some of the more recent advancements in the technology of mining, retorting, and refining of shale and shale oil. Also reviews progress in economic evaluation of the possibilities of utilization of this fuel. 15 ref.

3215 Catalytic Reforming Rebuilds Hydrocarbons. Arch L. Foster. *Petroleum Engineer*, v. 24, Jan. 1952, p. C3-C4.

Shows that the primary purpose of reforming is not to increase volume of motor fuel but largely to increase its quality for that purpose. Other processes are surveyed.

3216 Propylene Petrochemicals. V. C. Irvine. *Petroleum Processing*, v. 7, Jan. 1952, p. 46-48.

Discusses in detail 2 major branches of the propylene "tree"—isopropyl alcohol products and allyl chloride products. Diversification of their end-uses is given.

3217 How Jet Fuel Is Blended to Specifications. B. G. Adams. *Petroleum Refiner*, v. 31, Feb. 1952, p. 95-96.

Describes procedures followed by a refiner of Southern San Joaquin Valley crude oils.

3218 Shale Oil Production and Refining Today. Part I. Peter W. Sherwood. *Petroleum Refiner*, v. 31, Feb. 1952, p. 97-101.

Discusses various phases of shale-oil production and refining. 15 ref. (To be continued.)

3219 The Technique of Vacuum Still Operation. Q. E. Benedict. *Petroleum Refiner*, v. 31, Jan. 1952, p. 103-106.

Reviews all aspects of the subject and places special emphasis on the proper operation of vacuum stills and methods of resolving common operating problems. Of considerable interest are temperatures, pressures, flow-rates, and inspections of feeds and products.

3220 Correlating Physical and Thermodynamic Properties. Part II. (Concluded.) Donald F. Othmer and Roger Gilmont. *Petroleum Refiner*, v. 31, Jan. 1952, p. 107-116.

Continues with a description of methods for the correlation of physical chemical data used in petroleum technology. These methods depend on comparison of the properties of one substance with those of another substance under the same conditions. 30 ref.

3221 Estimating Oil Losses by Atmospheric Evaporation From Refinery Separator Surfaces. P. S. Viles and C. T. Jones. *Petroleum Refiner*, v. 31, Jan. 1952, p. 117-119.

On the basis of evaporation experiments conducted under actual separator conditions, an improved method for estimating evaporation losses was developed and is presented.

3222 Production of Ethylene From Petroleum Sources. Part III. (Concluded.) Peter W. Sherwood. *Petroleum Refiner*, v. 31, Jan. 1952, p. 126-130.

Reviews general principles, design considerations, and characteristics of methods for the above. 14 ref.

3223 Nomograph for Influence of Sulfur Compounds on T.E.L. Efficiency. George E. Mapstone. *Petroleum Refiner*, v. 31, Feb. 1952, p. 132-133.

Tells how to use the above. Briefly discusses the accuracy of this method.

3224 Possibility of Catalytic Processing With Bauxite for Improving Gasoline From the Middle East. (In Italian.) C. Padovani, A. Girelli, and C. Siniramed. *Rivista dei Combustibili*, v. 5, Nov. 1951, p. 591-608.

Describes work carried out at the "Stazione Sperimentale mentale per i Combustibili" on determination of different types of sulfur compounds in Middle East light distillates, and on factors governing the desulfurizing efficiency of different types of bauxite. 10 ref.

3225 Sulfur Compounds in Petroleum Distillates. Part III. Identification and Determination of Sulfur Compounds in Medium-Range Distillates. (In Italian.) A. Girelli, and A. M. Ilardi. *Rivista dei Combustibili*, v. 5, Nov. 1951, p. 609-616.

Recent investigations on sulfur compounds in petroleum distillates boiling in the kerosene and gas oil range are surveyed. Reactions of complexes, formation of sulfur compounds with mercuric acetate, chemical reactions with different reagents, and hydrodesulfurization followed by the examination of structure of hydrocarbons formed, are briefly reported.

3226* Military Barrier Materials. R. H. Wood. *Tappi*, v. 35, Jan. 1952, p. 128A-132A.

Above materials are designed to prevent deterioration of a large number of military items during transportation, handling, and storage. They may be roughly segregated into 3 groups: greaseproof, waterproof, and water-vaporproof. Gives details of the various specifications.

3227* Instrumentation Studies. LXVII. Erasability of Paper. IV. A Proposed Method for Evaluating the Erasing Quality of Paper. W. A. Wink, N. J. Beckman, W. P. Raney, and J. A. Van Den Akker. *Tappi*, v. 35, Jan. 1952, p. 137A-139A.

3228* The Coal Chemicals Shortage. M. Lelyn Branin. *Utilization*, Jan. 1952, p. 23-27.

Discusses the shortage of coal chemicals from an over-all point of view, excluding the benzene problem which was discussed

25. *Chemical Technology*

in a previous issue. Explains how changes in end-use pattern have changed the balance between supply and demand.

3229* Coefficient of Rate of Absorbtion in Horizontal Mechanical Scrubbers With a Low Rate of Revolution. (In Russian.) L. I. Agarev. *Zhurnal Prikladnoi Khimii*, v. 24, Apr. 1951, p. 341-352.

A large-scale laboratory scrubber was used to obtain quantative data on the absorbtion of CO_2 and NH_3 in water. Results are discused and tabulated.

Miscellaneous Publications

3230 Solvent Extraction of Oil From Cottonseed Prior to the Removal of Linters and Treatment of the Residue to Effect Separation of Meal, Hulls, and Linters. S. P. Clark and A. Cecil Wamble. Texas Engineering Experiment Station, Bulletin 125, 77 pages, Feb. 1, 1951. (T21 T31b)

The above investigation involved determination of the technical feasibility of the process by laboratory and pilot-plant work, and determination of the economic feasibility by estimated cost comparison with the process in current use.

Books

3231 A Source Book of Technical Literature on Fractional Distillation. 129 pages. Gulf Research & Development Co. (Z5524.D58 S84)

A collection of technical papers on distillation. Includes source material on which the science and practice of distillation are based. Part I covers the general theory of vapor-liquid equilibria, batch distillation, and binary mixture separation, beginning with the classical paper by Lord Rayleigh in 1902. Part II is a summary of existing literature on continuous multicomponent rectification.

3232 Holztechnologisches Handbuch. Band I. Allgemeines Holzkunde, Holzschutz und Holzvergütung. (Handbook of Wood Technology. Vol. I. Principles, Science, Protection, and Treatment of Wood.) Leopold Vorreiter. 548 pages. 1949. Verlag Georg Fromme & Co., Vienna 5, Austria. (TA419 V91h)

Deals with mathematics, principles of mechanics, wood structures, external appearance, chemical and physical properties, wood pests, wood preservatives, and treatments of woods for modification of their inherent properties. Numerous graphs, tables, diagrams, photographs, and photomicrographs. 4-page bibliography.

3233 Pulverdispersionen in Bituminösen Stoffen. (Powder Dispersions in Bituminous Materials.) Horst Walther. 104 pages. 1949. Strassen- und Tiefbau Verlagsgesellschaft m.b.H., Berlin-Pankow, Germany. (TN850 W17p)

Presents a report based on many years of plant and laboratory experience in the roofing paper and building-protection-materials industry. Extensive tabular and graphical data, photographs, diagrams, and micrographs reveal the great effect of type and properties of the fillers on quality of the finished product. 88 ref.

3234* Ullmanns Encyklopädie der technischen Chemie. Band I. Chemischer Apparatebau und Verfahrenstechnik. (Ullmann's Encyclopedia of Chemical Technology. Vol. I. Chemical Apparatus Construction and Process Technique.) Ed. 3. E. Wicke and E. Römer, editors. 1011 pages. 1951. Urban & Schwarzenberg, Munich and Berlin, Germany. (TP9 UL5)

Contains comprehensive articles by different groups of authors on Thermodynamics and Flow; Pressure and Vacuum Technique; Heating and Cooling Technique; Separation of Materials; Purification of Materials; Reaction Apparatus; and Materials. Graphs, tables, drawings, photographs and numerous references.

See also:

2747 (polyphosphate detergents)
2755 (prevention of marine attack)
3167 (marine-borer attack on pile foundations Ed. 1)
3280 (commercial production of oxygen)
3281 (technical applications of activated Al_2O_3)
3380 (antioxidants for edible fats)
3386 (electrolytic production of organic chemicals)
3496 (carbon-black differentiation)
3541 ("Farm Chemicals"—trade magazine)
3632 (fluid-flow symposium)
3669 (chemical stabilizers for dielectric papers)
3742 ("Food Technology"—periodical just received)
3763 (chemical manufacturing directory—Britain)

26. CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL

3235* A Simple Method of Determining the Dielectric Constant of Liquids in the Cm.-Wave Range. (In German.) F. Reder and E. Hafner. *Acta Physica Austriaca*, v. 5, Dec. 1951, p. 189-201.

An improved and highly accurate method for the above is described and illustrated. Data are tabulated.

3236* Cryoscopic Measurements in Fused Salts at Elevated Temperatures. Preliminary Report. (In English.) H. Flood, T. Forland, and A. Nesland. *Acta Chemica Scandinavica*, v. 5, nos. 7-8, p. 1193-1198.

Describes method which permits accurate determination of the liquidus curve of phase diagrams at high temperatures. The method is based on separation of a fraction of liquid from solid + liquid by filtration at the equilibrium temperature. Sulfate sides of the binary systems Na_2SO_4-NaCl and Na_2SO_4-NaBr were investigated by this method. From these measurements, heat of fusion of Na_2SO_4 is estimated to be 6100 cal., and the two systems are found to form ideal mixtures in the liquid state.

3237* Intermolecular Free Lengths in Liquids in Relation to Compressibility, Surface Tension and Viscosity. (In English.) Bertil Jacobson. *Acta Chemica Scandinavica*, v. 5, nos. 7-8, 1951, p. 1214-1216.

Theoretical analysis and graphical interpretation for typical examples.

3238* On the Complex Chemistry of the Uranyl Ion. V. The Complexity of Uranyl Sulfate. (In English.) Sten Ahrland. *Acta Chemica Scandinavica*, v. 5, nos. 7-8, 1951, p. 1151-1167.

Above was investigated potentiometrically as well as extinctiometrically. Results are tabulated, charted, and discussed. 15 ref.

3239* A Basic Concept of Equilibrium Moisture. S. M. Henderson. *Agricultural Engineering*, v. 33, Jan. 1952, p. 29-32.

The above study was made to determine the mathematical characteristics of equilibrium moisture curves, special consideration being given the relationship of temperature to the position of the curves. 26 ref.

3240* Reasons for Optimum Catalytic Activity According to Dispersion and Effective Specific Surface of the Catalysts. (In Russian.) A. M. Rubinshtein and V. E. Vasserberg. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 11, 1951, p. 263-266.

Optimum sizes of catalyst particles were experimentally studied for several reactions. Results are discussed and tabulated.

3241* The Theory of Monomolecular Adsorption on Homogeneous Surfaces. (In Russian.) B. P. Bering and V. V. Serpinskii. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 11, 1951, p. 273-276.

An equation of state for adsorbed layers was developed. Results are discussed, tabulated, and charted. 15 ref.

3242* Compressibility of Nitrogen at Pressures Up to 10,000 Atmospheres. D. S. Tsiklis. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 11, 1951, p. 289-290.

Above was determined between 6000 and 10,000 atm. and at 50, 100, and 150°C. Data are discussed and tabulated.

3243* The Structure of Activated Carbon and Its Absorption Properties Toward Different Vaporized Materials. (In Russian.) N. N. Abgul, O. M. Dzhigit, M. M. Dubinin, and A. V. Kiselev. *Doklady Akademii Nauk SSSR*, new ser, v. 79, July 21, 1951, p. 451-454.

The absorption properties of activated carbon in relation to size and uniformity of porosity were studied. Data are discussed, tabulated, and charted.

3244* Energy of Dissociation of Copper Arsenide. (In Russian.) M. E. Kochnev. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 463-465.

The energy of dissociation of Cu-As alloys in relation to temperature was studied and compared with the equilibrium diagram of the system. Data are tabulated and charted.

3245* Structural Types of Natural Absorbents. (In Russian.) V. T. Bykov. *Doklady Akademii Nauk SSSR*, new ser., v. 79, Aug. 1, 1951, p. 621-624.

The structure of various natural absorbents was investigated. Results are compared with those for synthetic materials. Data are discussed, charted, and tabulated.

3246 The Transfer of Oxygen Atoms in Oxidation-Reduction Reactions. III. The Reaction of Halogenates With Sulfite in Aqueous Solution. IV. The Reaction of Hydrogen Peroxide With Sulfite and Thiosulfate, and of Oxygen, Manganese Dioxide and of Permanganate With Sulfite. Joseph Halperin and Henry Taube. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 375-382.

24 references.

3247 Anodic and Cathodic Voltammetry of Thallium at the Rotated Platinum Wire Electrode. I. M. Kolthoff and Joseph Jordan. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 382-385.

Anodic oxidation of thallous to thallic Tl at the rotated Pt-wire electrode was studied at various pH's, using an automatic recording instrument. Proportionality between diffusion current and concentration was found in NaOH solutions. 14 ref.

3248 The Self-Diffusion Coefficients of the Ions in Aqueous Sodium Chloride and Sodium Sulfate at 25°. Julian M. Nielsen, Arthur W. Adamson, and James W. Cobble. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 446-451.

Procedures are reported whereby the diaphragm-cell technique may adequately be adapted to the measurement of iron self-diffusion coefficients in aqueous solution through use of isotopic labelling of ions. The problems of stirring and of calibration are discussed.

3249 Low Temperature Heat Capacity, Entropy at 298.16°K. and High Temperature Heat content of Titanium Disulfide. S. S. Todd and J. P. Coughlin. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 525-526.

Low-temperature heat capacity of TiS_2 was measured from 51 to 298°K. High-temperature heat content was measured from 298 to 1010°K. A transition, involving no isothermal heat absorption but corresponding to a maximum in heat capacity, was found at 420°K.

3250 Chemistry of Technetium. I. Preparation of Technetium Heptoxide. G. E. Boyd, J. W. Cobble, C. M. Nelson, and W. T. Smith, Jr. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 556-557.

3251 The Oxidation of Calcium at Elevated Temperatures. Daniel Cubicciotti. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 557-558.

Experimental results are charted and discussed.

3252 Studies of the Fischer-Tropsch Synthesis. XII. Composition Changes of Nitrided Iron Catalysts During the Synthesis. J. F. Shultz, B. Seligman, J. Lecky, and R. B. Anderson. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 637-640.

Deals with changes in the composition of nitrided iron catalysts during the synthesis; and shows that these catalysts oxidize at a much slower rate than reduced catalysts under corresponding conditions. 10 ref.

3253 Microwave Absorption and Molecular Structure in Liquids. VII. Effects of Viscosity and Dipole-Dipole Forces. A. J. Curtis, P. L. McGeer, G. B. Rathmann, and C. P. Smyth. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 644-648.

The dielectric constants and loses of solutions of t-butyl chloride, methyl chloroform, n-tetradecyl bromide, and α-chloronaphthalene in n-heptane and in a viscous paraffin oil, and of t-butyl chloride and n-tetradecyl bromide in CCl_4 were measured at wave lengths of 1, 3, and 10 cm. and temperatures between 4 and 60°C. 17 ref.

3254 Preparation and Properties of Serum and Plasma Proteins. XXXII. The Interaction of Human Serum Albumin With Zinc Ions. F. R. N. Gurd and DeWitt S. Goodman. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 670-675.

The interaction of human serum albumin with zinc ions was studied in unbuffered solutions in 0.15 M $NaNO_3$ to which varying quantities of NaOH and $ZnCl_2$ were added. Results are interpreted. 28 ref.

3255 Polymorphism of Ga_2O_3 and the System Ga_2O_3-H_2O. Rustum Roy, V. G. Hill, and E. F. Osborn. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 719-722.

Presents results of an investigation on the above. 14 ref.

3256 Polarographic Maxima Suppression in Alcohol-Water Mixtures. Eugene L. Colichman. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 722-725.

The various factors involved and their influences on polargraphic maxima was studied. The concentrations of colloidal agents necessery to suppress maxima, were found to increase with increasing alcohol content of the solvent. A linear-relationship is noted. An empirical maxima suppression equation is deduced and discussed. Results are interpreted in terms of previously reported micelle phenomena. 15 ref.

3257 A Study of Interactions Between Dipole Molecules in Benzene Solution by a Cryoscopic Method. Bernard C. Barton, David A. Rothrock, Jr., and Charles A. Kraus. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 786-789.

Describes the above. The freezing-point depression of 17 dipolar substances was measured as a function of concentration. In addition, the freezing-point depression was determined for equimolar mixtures of several pairs of dipolar molecules.

3258 Molecular Compounds and Their Spectra. II. Robert S. Mulliken. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 811-824.

Presents a detailed discussion on the above. 62 ref.

3259 Anion Exchange Studies. IV. Cobalt and Nickel in Hydrochloric Acid Solutions. George E. Moore and Kurt A. Kraus. *Journal of the American Chemical Society*, v. 74 Feb. 5, 1952, p. 843-844.

The anion exchange behavior of Ni^{++} and Co^{++} in 0.5-12 M HCl was studied by measuring their elution constants.

3260 Quantitative Calculation of the Behavior of Elution Bands in the Separation of Rare Earths on Ion-Exchange Columns. Quantitative Theory of Rare Earth Separations on Ion-Exchange Columns. F. H. Spedding and J. E. Powell. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 856-857.

Briefly discusses the above.

3261 Properties of Ionic Bombarded Silicon. Russell S. Ohl. *Bell System Technical Journal*, v. 31, Jan. 1952, p. 104-121.

Deals with a new technique by which the properties of Si surfaces are altered materially by bombardment with ions of such gases as H_2, He, N_2, and A. Effects of bombardment on the rectifying properties are illustrated by a series of characteristic curves systematically arranged to bring out effects of variables such as ion velocity, intensity of bombarding current, length of bombardment, kind of gas, and temperature of the specimen during bombardment. Effect of bombardment on materials contaminated with impurities is also illustrated.

3262 Radiation Chemistry Investigation of Aqueous Solutions Using P^{32} and S^{35} as Internal Sources. T. J. Hardwick. *Canadian Journal of Chemistry*, v. 30, Jan. 1952, p. 39-46.

Results of experiments show that chemical dosimetry methods may be used for the accurate determination of energy absorption for electron energies as low as 45 kev. or X-rays of 200 kev. 18 ref.

26. *Chemistry—General, Inorganic, and Physical*

3263 The Oxidation of Ferrous Sulphate Solutions by γ-Rays—The Absolute Yield. T. J. Hardwick. *Canadian Journal of Chemistry*, v. 30, Jan. 1952, p. 17-22.

The absolute value of the yield of ferric ion on the irradiation of $FeSO_4$ by γ-rays was determined using the Bragg-Gray cavity principle.

3264 The Reduction of Ceric Sulphate Solutions by Ionizing Radiation. T. J. Hardwick. *Canadian Journal of Chemistry*, v. 30, Jan. 1952, p. 23-38.

The yield of cerous ions formed in the reduction of ceric ion in H_2SO_4 solutions by X- and γ-radiation was found to be independent of cerous and ceric ion concentration, energy of the radiation, rate of energy absorption over a wide range, acid concentration, and the presence of oxygen. 23 ref.

3265 A Survey of Physical Chemistry. H. Mackle. *Chemical Age*, v. 66, Jan. 12, 1952, p. 76-83.

Indicates trends of development in valency, crystal structure, hydrocarbons, proteins, clathrate compounds, and the tropolones. 56 ref.

3266 Five Ways to Use Ion Exchange. *Chemical Engineering*, v. 59, Jan. 1952, p. 320, 322.

Discusses exchange of ionic constituents, removal of ionic constituents, fractionation of mixtures, concentration of ionic substances, and catalysis and adsorption.

3267* Influencing the Rectification Processes by the Chemical Nature of the Filler. (In German.) Otto Fuchs. *Chemie-Ingenieur-Technik*, v. 23, Nov. 28, 1951, p. 537-540.

Experiments with an acetic acid–water mixture showed that porous fillers are more effective than nonporous ones. Diagrams explain reasons for this result. Data are tabulated. 16 ref.

3268* Variation in Aspects of the Fine Structure of an Infrared Absorption Spectrum Observed With a Slit of Variable Width. (In French.) Josette Vincent-Geisse. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Nov. 12, 1951, p. 1179-1181.

Discusses the possibility of obtaining the fine structure of a fundamental vibration-rotation band of CO when the width of the slit is greater than the distance between 2 consecutive rays.

3269* Uranium Oxides of Variable Composition. (In French.) André Boullé, Robert Jary, and Marthe Dominé-Bergès. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Nov. 19, 1951, p. 1281-1284.

Discusses the above, in particular the oxidation of U_3O_7.

3270 Thermal Diffusion in the Presence of a Dissociating Gas. E. Whalley. *Transactions of the Faraday Society*, v. 47, Dec. 1951, p. 1249-1255.

The effect of a dissociating gas on the separation of two gases by thermal diffusion was examined in the light of the kinetic theory of gases. 12 ref.

3271 Thermochemical Dissociation Energies of Gaseous Calcium, Strontium and Barium Oxides. G. Drummond and R. F. Barrow. *Transactions of the Faraday Society*, v. 47, Dec. 1951, p. 1275-1277.

Presents the above which were made over a wide range. Data are compared with and are in agreement with those obtained by other investigators. 14 ref.

3272 The Solubility of the Aiuminium Halides in Benzene. D. D. Eley and P. J. King. *Transactions of the Faraday Society*, v. 47, Dec. 1951, p. 1287-1292.

Studies on the above indicate that results for $AlCl_3$ and $AlBr_3$ lie close to the theoretical curve for an ideal solution, but that there is marked deviation with AlI_3. 23 ref.

3273 The Reaction Between Deuterium and Ammonia on Evaporated Metal Catalysts. J. H. Singleton, E. R. Roberts, and E. R. S. Winter. *Transactions of the Faraday Society*, v. 47, Dec. 1951, p. 1318-1331.

The exchange reaction was examined on evaporated films of Fe, W, and Ni at temperatures above 500°K. Fe and Ni catalysts may, after sintering, be used for long periods without change in activity; a slow increase was observed in the activity of W catalysts on heating to 700°K. in vacuum or in the presence of reactants. The effect of variations in the pressure of ammonia and deuterium was examined and accurate values for energy of activation of exchange are recorded for each metal. Some observations on poisoning of the catalysts are presented. Graphs and tables. 27 ref.

3274 General Equations for the Kinetics of Electrode Processes. Roger Parsons. *Transactions of the Faraday Society*, v. 47, Dec. 1951, p. 1332-1344.

Application of above equations to the hydrogen-evolution reaction shows that an extensive study of pH and salt effects is unnecessary for identification of the rate-determining step in these reactions. 17 ref.

3275* An Interferometric Micro Method for Diffusion Measurements. (In German.) H. Labhart, W. Lotmar, and P. Schmid. *Helvetica Chimica Acta*, v. 34, Dec. 1, 1951, p. 2449-2457.

Describes specific apparatus made by Kern & Co., Aarau, procedure for its use, and typical results for an organic and an inorganic compound.

3276* The Redoxokinetic Effect—A General Phenomenon. K. S. G. Doss and H. P. Agarwal. *Proceedings of the Indian Academy of Sciences*, v. 34, sec. A, Oct. 1951, p. 229-235.

Doss and Agarwal discovered that when an alternating field is incident on two Pt electrodes, dipped in an aqueous solution containing quinhydrone, a d.c. potential is developed at each of these electrodes. As this phenomenon is connected with the kinetics of redox processes at the electrodes, the phenomenon has been named "redoxokinetic effect" and the potential is referred to as the "redoxokinetic potential." In the present work, a few redox systems were studied in order to find out if this is a general phenomenon.

3277* Photoelastic Constants of Sodium Chlorate From Ultrasonic Diffraction. K. Vedam and G. N. Ramachandran. *Proceedings of the Indian Academy of Sciences*, v. 34, sec. A, Oct. 1951, p. 240-244.

Details are given of the theory and technique of measuring photoelastic constants in optically active cubic crystals from ultrasonic diffraction of light. The results thus obtained, in conjunction with measurements of relative path retardation produced by stressing the crystal, enable one to obtain all 4 constants independently.

3278* The Theory of Redoxokinetic Effect and a General Method for the Determination of "a" of Absolute Reaction Rates. K. S. G. Doss and H. P. Agarwal. *Proceedings of the Indian Academy of Sciences*, v. 34, sec. A, Oct. 1951, p. 263-271.

When 3 Pt electrodes dipped in an aqueous solution are connected to a source of a.c., a d.c. potential is developed at each of the electrodes. This potential can be measured with reference to a 3rd Pt electrode of large area dipped in the same solution. This phenomenon, which is caused by kinetic factors controlling oxidation and reduction reactions at the electrodes, is termed the "redoxokinetic effect." Formulates a theory to explain it quantitatively.

3279* The Chemical Behaviour of Sulphur Compounds. Part III. Kinetics of the Gaseous Reaction Between Hydrogen Sulphide and Sulphur Dioxide. A. R. Vasudeva Murphy and B. Sanjiva. *Proceedings of the Indian Academy of Sciences*, v. 34, sec. A, Nov. 1951, p. 283-298.

38 references.

3280 Recent Development in the Low Temperature Separation of Gases. M. Pearce. *Industrial Chemist and Chemical Manufacturer*, v. 28, Jan. 1952, p. 3-6.

Deals with matters which are considered to be of major interest in the development of gas-separation technology. Includes separation of air, with a separate section on the production of "tonnage" oxygen, and the separation of gases other than air.

3281 Recent Technological Applications of Activated Alumina. H. Harwood. *Industrial Chemist and Chemical Manufacturer*, v. 28, Jan. 1952, p. 16-23.

Gives an account of recent work on the physical structure of activated alumina and expansion in its uses.

3282 Iodine as a Catalyst. *International Chemical Engineering and Process Industries*, v. 33, Jan. 1952, p. 37.

Discusses the above. Includes halogenation, condensation, alkylation, hydrogenation, and sulfuration reactions.

3283 Hydrogen-Deuterium Exchange Activity of Catalysts. V. C. F. Holm and R. W. Blue. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 107-113.

Activities of 12 commercial and 13 especially prepared catalysts were measured for the reaction $H_2+D_2=2HD$. This reaction is thought to proceed via dissociation of H_2 molecules and recombination of adsorbed atoms; it should, therefore, provide some information about the relative activity of catalysts for hydrogenation and dehydrogenation. Range of activities covered was about 1,000,000, from synthetic silica-alumina catalysts with low activity to Ni on diatomaceous earth with very high activity. 18 ref.

3284 Compressibilities of Mixtures of Hydrogen and Nitrogen Above 1000 Atmospheres. Carroll O. Bennett and Barnett F. Dodge. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 180-185.

Apparatus is diagrammed; data are tabulated and charted. 46 ref.

3285 Volumetric Behavior of Nitrogen Dioxide in the Liquid Phase. H. H. Reamer and B. H. Sage. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 185-187.

Specific volume of above compound was determined up to 6000 psi. for temperatures between 70 and 310°F. Results are presented in graphical and tabular form. 13 ref.

3286 Thermodynamic Properties of Chlorotrifluoromethane. L. F. Albright and J. J. Martin. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 188-198.

Apparatus is diagrammed; data are tabulated and charted. 15 ref.

3287 Phase Equilibria in Hydrocarbon Systems; Volumetric Behavior of the Nitrogen-Ethane System. H. H. Reamer, F. T. Selleck, B. H. Sage, and W. N. Lacey. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 198-201.

18 references.

3288 Vapor-Liquid Equilibria at Subatmospheric Pressures; Binary System Acetone-Carbon Tetrachloride. Kenneth C. Bachman and Edward L. Simons. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 202-205.

20 references.

3289 Vapor-Liquid Equilibria in Methanol Binary Systems. Methanol-Propanol, Methanol-Butanol, and Methanol-Pentanol. Methanol-Methyl Ethyl Ketone, Methanol-Methyl Propyl Ketone, Methanol-Methyl Isobutyl Ketones. Wallace D. Hill and M. Van Winkle. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 205-210.

14 references.

3290 Solubility of Ethylene in Water; Effect of Temperature and Pressure. E. J. Bradbury, Dorothy McNulty, R. L. Savage, and E. E. McSweeney. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 211-212.

Data are presented to show the effect of pressure upon the above at 35, 55, 75, and 100°C. for pressures of 1-523 atm. Results indicate an inversion around 75°C., where the solubility shows a tendency to increase with increasing temperature.

3291 Distillation in a Multitube Wetted-Wall Column. E. E. Lindsey, J. M. Kiefer, and C. L. Huffine. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 225-231.

Experiments made on a column utilizing the outer surfaces of 7 parallel tubes as wetted walls and the systems methanol-water and trichloroethylenetoluene show that the wetted-wall column is somewhat less efficient than an equivalent packed column at any but the lowest reflux ratios, although pressure drop through the column is considerably less. Indications are that efficiency can be improved by closer spacing of the tubes without sacrifice in pressure drop. 20 ref.

3292 Heats of Combustion of Some Nitro Alcohols. R. M. Currie, C. O. Bennett and Dysart E. Holcomb. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 329-331.

Presents an investigation on the above and investigates the possibility of correlating these data with some other easily derived property so that the calculations may be extended to include other compounds of this type. 15 ref.

3293 Kinetics of Alkaline-Catalyzed Phenol-Formaldehyde Reaction; Ammonia. Sodium Hydroxide. L. M. Debing, G. E. Murray, and R. J. Schatz. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 354-359.

Studies of reaction rates of hexa-catalyzed phenolformaldehyde reactions were studied and found to follow 1st-order behavior. Reaction-rate constants were determined at different catalyst concentrations and temperatures. 17 ref.

3294* Hydrodynamic Theory of the Change of Type of Boiling During Free Convection. (In Russian.) S. S. Kutateladze. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Apr. 1951, p. 529-536.

The change from "bubbling" boiling to "layer" boiling is treated theoretically. Results are discussed in relation to experimental data, and are charted. 10 ref.

3295* Two New Methods of Measuring Diffusion Coefficients in Gels. (In French.) Jean Salvinien. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Sept.-Oct. 1951, p. 465-470.

Presents the above, one method being for absolute, and the other for relative, measurements. The results obtained contribute to the theory of solvation of ions.

3296* Electron Transfers in Solutions and at Electrodes. Part I. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Sept.-Oct. 1951, p. C1-C41.

Series of papers presented at meeting of Société de Chimie Physique, May 8-10, 1951. This part consists of introduction by M. Haïssinsky, plus 7 papers by various authors (5 in English, 2 in French).

3297* Absolute Measurements in Diffusion Coefficients in Gels With the Aid of Radioactive Isotopes. (In French.) J. Salvinien, R. Marignan, and S. Cordier. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Sept.-Oct. 1951, p. 471-473.

Discusses methods based on the use of radioactive isotopes which make possible simple, direct, and precise measurements of diffusion coefficients in gels. Because of their sensitivity, they can possibly impart information on phenomena which occur at the gel-solution interface during diffusion. Includes tables.

3298* Apparatus for Spectrographic Absorption Studies by Compressed Gases Up to 1200 Kg./Cm.^{2}. (In French.) Stephane Robin. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Sept.-Oct. 1951, p. 415-422.

Describes several apparatus used for measuring the dissolution of solids in compressed gases by spectrographic methods; also the disturbance of spectral rays of different elements and compounds by different compressed gases (N_2, A, H_2) in the visible, ultraviolet, or extreme ultraviolet range. Includes diagrams.

3299* Temperature Effect of the Zn/Zn^{++} Half-Cell. (In French.) M. Bonnemay. *Journal des Recherches du Centre National de la Recherche Scientifique*, no. 16, 1951, p. 9-12.

Analyzes the various components of the emf. of the cell $Zn/ZnSO_4:ZnSO_4/Zn$ and shows that it is possible by measuring them to obtain the constant activity-temperature coefficient of the Zn electrode. Experimental results relative to Zn are given.

3300 Formaldehyde Condensations With Phenol and Its Homologues. XIII. The Relative Reactivity of the Ortho and Para Positions in the Formation of Alcohols of Substituted Phenols. S. R. Finn and G. J. Lewis. *Journal of Applied Chemistry*, v. 1, Dec. 1951, p. 560-562.

3301 Electron Microscopic Replica Studies of Porosity in Fused Iron Catalysts. J. T. McCartney and R. B. Anderson. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1441-1443.

The preparation of various replicas of a fused iron catalyst is described. Micrographs of these replicas show comparable fine structures that are attributed to the pores developed in the catalyst upon reduction. Dimensions of these fine structures compare reasonably well with pore diameters calculated from pore volume-surface area determinations.

26. *Chemistry—General, Inorganic, and Physical*

3302 Tracer Isotopes in Biochemistry. Catharine M. Bergen. *Journal of Chemical Education*, v. 29, Feb. 1952, p. 84-89.

Reviews the above. Discusses isolation, detection, isotopes in metabolism studies, isotopic compound formation and recovery. Presents results of isotopic studies. 35 ref.

3303 Magnetic Study of Some Inorganic Compounds of Arsenic, Antimony, and Bismuth. Mata Prasad, C. R. Kanekar, and L. N. Mulay. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1440-1444.

Deals with the above. Attempts were made to see whether the graphical method of Prasad and coworkers is applicable to the salts of metalloids and to compare experimentally deduced values with theoretical ones. Data are tabulated.

3304 Dielectric Relaxation in Glycerol, Propylene Glycol, and n-Propanol. D. W. Davidson and R. H. Cole. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1484-1490.

Complex dielectric constants were measured at frequencies from below 20 c./s. to 5 mc./s. over the range 40 to −75°C. in glycerol; −45 to −90° in propylene glycol; and −80 to −140° in n-propanol. Significance of the various results is discussed. Graphs and tables. 24 ref.

3305 The Dielectric Constant of Ethylene at High Pressures. H. G. David, S. D. Hamann, and J. F. Pearse. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1491-1495.

The above was measured at pressures up to 500 atm. and at 25 and 50°C. At both temperatures the Clausius-Mosotti function was found to pass through a maximum with increasing density. Results were discussed with reference to Kirkwood's theory of dielectric polarization. 24 ref.

3306 A Comparative Sutdy of Unpolarizable and Polarizable Metal-Solution Systems. D. MacCillavry. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1499-1504.

The properties of the metal-solution potentials of Ni in Ni free hydroxide and phosphate solutions were compared with the properties of unpolarizable electrodes and of polarizable metal-solution systems. The electrochemical equilibria of unpolarizable systems are analyzed in terms of transfer mechanisms between the phases present. 18 ref.

3307 The Effect of Ultrasonic Radiation on the Electrolytic Separation of Deuterium. Donald F. Mason, Royce E. Biddick, and Charles A. Boyd. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1551-1553.

The application of ultrasonic radiation to the polished Pt cathode of an electrolysis cell increased the coefficient for the electrolytic separation of deuterium. The radiation also decreased the temperature dependence of the separation coefficient.

3308 The Vibration Spectrum of Rutile. Frank Matossi. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1543-1546.

Raman-effect data for rutile are evaluated for the force constants. It is shown that quasi-molecules of TiO_2 are formed with strong Ti-O bonds although every Ti atom is surrounded by 6 O_2 atoms at about equal distances.

3309 The Effect of pH on the Rate of Surface Tension Lowering. Emil J. Burcik and Carlos R. Vaughn. *Journal of Colloid Science*, v. 6, Dec. 1951, p. 522-527.

Gives experimental method and results of the above investigation.

3310 The Effect of Surface Conditions on the Electrophoresis of Solid Particles. F. Booth. *Journal of Colloid Science*, v. 6, Dec. 1951, p. 549-556.

Examines theoretically modification of the existing theory of electrophoresis of solid spherical particles by consideration of electrical boundary conditions at solid-liquid interface.

3311 The Electrochemistry of Permselective Membranes. III. The Electrical Resistance of Permselective Collodion Membranes in Solutions of Various Electrolytes. Karl Sollner and Harry P. Gregor. *Journal of Colloid Science*, v. 6, Dec. 1951, p. 557-570.

3312 Hydrophobic Films on Solid Surfaces. George J. Kahan. *Journal of Colloid Science*, v. 6, Dec. 1951, p. 571-575.

Discusses and presents results of experiments on hydrophobic films and monolayers on metal and glass. Film formation was obtained on metals with both cationic and anionic surface-active compounds; on glass, it was obtained only with cationic wetting agents.

3313 Volatility and Stability of Metallic Sulphides. C. M. Hsiao and A. W. Schlechten. *Journal of Metals*, v. 4, Jan. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 194, 1952; p. 65-69.

The apparent vapor pressures of a number of metal sulfides were determined by measuring their rate of weight loss when they were heated under vacuum. Information should be useful in determining the practicality of selective volatilization of the sulfides as well as an aid in planning direct reduction processes for sulfide ores. Graphed and tabulated data. 18 ref.

3314 Complexes in Oxidation-Reduction Reactions. The Copper (II)-Cyanide Reaction. Frederick R. Duke and Welby G. Courtney. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 19-21.

Discusses and presents results of above investigation.

3315 Complex Ions From Iron and Ethylenediaminetetraacetate: General Properties and Radioactive Exchange. S. S. Jones and F. A. Long. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 25-33.

24 references.

3317 Polymerization and Depolymerization Phenomena in Phosphate—Metaphosphate Systems at Higher Temperatures. Condensation Reactions Involving the Potassium Hydrogen Orthophosphates. R. K. Osterheld and L. F. Audrieth. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 38-42.

Methods of differential thermal analysis, X-ray diffraction, and chemical analysis, together with dehydration studies, were employed to investigate condensation reactions which take place when the potassium hydrogen orthophosphates and their mixtures are heated. 10 ref.

3318 Electrolytic Interaction of Nylon With Aqueous Solutions of Sodium Hydroxide. Frederick T. Wall and Thomas J. Swoboda. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 50-56.

Theoretical equations are derived to describe the interaction of fibrous nylon suspended in aqueous acids or bases. Experiments were also carried out using indrawn nylon fibers in aqueous NaOH. Good agreement was observed between theory and experiment. The results are used to calculate equilibrium constants for ion-absorption and neutralization processes. 12 ref.

3319 A Theory of Polyelectrolytes. George E. Kimball, Melvin Cutler, and Harold Samelson. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 57-60.

Several theories were developed to account for properties of polymeric materials containing ionizing groups, when they are dissolved in solvents such as water. Certain Debye-Hückel approximations are inaccurate, but the Donnan potential method is applicable in many cases. A satisfactory model and theory, which depends on the validity of the Poisson-Boltzmann equation, and the legitimacy of replacing the chain force by a central force, was developed.

3320 Experimental Factors and Activity Coefficients in Ion Exchange Equilibria. William J. Argersinger, Jr., and Arthur W. Davidson. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 92-96.

Presents results of investigation of the above. 15 ref.

3321 The Diffusion Process for Organolite Exchangers. Jack J. Grossman and Arthur W. Adamson. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 97-100.

Discusses and presents results of investigation of the above. 13 ref.

3322 Electrochemical Properties of a Permionic Anion Membrane. J. T. Clarke, J. A. Marinsky, W. Juda, N. W. Rosenberg, and S. Alexander. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 100-105.

Correlation of diffusion, transport number, and conductivity data with chemical equilibria considered to exist in a weakly basic anion-exchange medium are reported. The data are consistent with the assumption that the resin studied has the properties of a simple electrolyte solution phase in which the resin salt is partially dissociated with a dissociation constant less than 1 and greater than 0.1.

3323 Electromigration in a Cation Exchange Resin. II. Detailed Analysis of Two-Component Systems. K. S. Spiegler and C. D. Coryell. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 106-113.

Electromigration in a cation-exchange column flushed with deionized water was observed by tagging laminas of adsorbate with radiotracers and observing their migration in an electric field. It was shown that conductance is ionic and the current is carried only by the cations. Broadening of the tagged band occurs as electrolysis proceeds. Applications of noted phenomena for separations of ions and resin regeneration are discussed. 10 ref.

3324 Ion Exchange Studies of Complex Ions as a Function of Temperature, Ionic Strength, and Presence of Formaldehyde. Jack Schubert. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 113-118.

The use of ion-exchange materials for the study of complex ions is reviewed. Experimental details are given of the ion-exchange method utilizing carrier-free radiotracers for determination of composition and stability of complex ions. The ligands studied were aspartic, succinic, and malic acids, butylamine, ethanolamine, and formaldehyde. 46 ref.

3325 Ion Exchange Separation Based Upon Ionic Size. T. R. E. Kressman. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 118-123.

Discusses and presents results of the above investigation. 13 ref.

3326 The Surface Structure and Properties of Colloidal Silica and Alumina. Ernest A. Hauser and D. S. LeBeau. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 136-139.

Systematic studies of different synthetic silica gels, silicic acid gel, alumina-silica gel and magnesia-silica gels by differential thermal analysis and X-ray diffraction give definite proof that these products are amorphous in structure. With the exception of magnesia-silica gel, they all show only an endothermic peak between 150 and 175°C. Electron photomicrographs offer visual evidence that the large particles are aggregates, resulting in particles of exceptionally high porosity.

3327 Adsorption of Nitrogen, Oxygen, and Argon on Rutile at Low Temperatures; Applicability of the Concept of Surface Heterogeneity. J. M. Honig and L. H. Reyerson. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 140-144.

Above was investigated at liquid N_2 and O_2 temperatures in the region of low relative pressure. Distribution of adsorption energies among surface sites was computed and is shown to differ with each adsorbate. The reason for these differences and the usefulness of the concept of surface hetrogeneity are discussed. 23 ref.

3328 Crystal Structure of Heavy Metal Orthovanadates. W. O. Milligan and L. W. Vernon. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 145-148.

A brief summary and discussion of results of above investigation.

3329 Correlation Between Sensitivity to Acid Hydrolysis and Skin-Core Differentiation in Viscose Rayon. P. H. Hermans and D. Heikens. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 187-190.

It is shown that extent of hydrolysis under a given set of conditions is qualitatively related to thickness of the rayon skin. This interpretation is preferable to that of relating extent of hydrolysis to crystalline-amorphous ratio.

3330* Kinetics of the Aging of Active Magnesium Oxide. (In German.) G. F. Hüttig. *Kolloid Zeitschrift*, v. 124, Dec. 1951, p. 160-163; disc., p. 163.

Active MgO was prepared by heating $MgCO_3$. Effect of temperature was determined in the range 480-650°C. Data are graphed and tabulated. 12 ref.

3331* Glow-Discharge Electrolysis. XIX. Reduction of Sulfuric Acid in Aqueous Solution. (In German.) W. Kohl and A. Klemenc. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, Dec. 15, 1951, p. 1041-1045.

Shows that glow-discharge electrolysis reduces as well as oxidizes H_2SO_4 to form SO_2. Saturated solutions of $MgSO_4$ and $(NH_4)_2SO_4$ were found to yield no SO_2. Reduction of H_2SO_4 occurs in the gaseous phase, while oxidation occurs at the surface. Diagrams, graphs, and references.

3332* Reactions of Ferrous and Ferric Ions With Hydrogen Peroxide. (In German.) E. Abel. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 82, Dec. 15, 1951, p. 1104-1108.

Shows that the mechanism of above reactions described in recent publications is incorrect; and that, rather, H_2O_2 is subject to ferrous-ferric-ion catalysis in which the reactions automatically occur.

3333 A New Method for Measuring the Atomic Heats of Gases. H. S. Gregory and I. I. Sherif. *Nature*, v. 168, Dec. 29, 1951, p. 1123.

Presents a modification of a previously developed method. It takes into account the dependence of the accommodation coefficient upon the pressure of the gas at very low pressures.

3334* Automatic Sample Separator for Radioactive Liquids. A. E. Bennett. *Nucleonics*, v. 10, Feb. 1952, p. 14-18.

An ion-exchange column can be used to separate fission products with each product producing a corresponding peak in observed activity. The device described uses a 3 to 1 counting-rate circuit that detects these peaks with uniform accuracy over a wide range. Diagrams.

3335 Optical Rotation of Polarized Light by Chemical Compounds. Wallace R. Brode. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 987-996.

Presents a survey of the application of plane polarized light to the determination of the configuration of asymmetric organic compounds. The concept of asymmetric structures is discussed and methods of separation of optical isomers are indicated. Spectropolarimeters for determination of rotatory dispersion curves are described and examples of normal and anomalous rotatory dispersion curves are given.

3336* On a General Thermodynamic Theory of the Equation of State. (In English.) P. Foulkes. *Physica*, v. 17, Nov.-Dec. 1951, p. 943-952.

A mathematical treatment.

3337* Pressure-Induced Absorption. I. The Calculation of Pressure-Induced Absorption in Pure Hydrogen and Deuterium. II. The Calculation of Pressure-Induced Absorption in Hydrogen-Helium Mixtures. (In English.) J. Van Kranendonk and R. Byron Bird. *Physica*, v. 17, Nov.-Dec. 1951, p. 953-975.

14 ref.

3338* Oriented Deposits on Crystalline Substrates. D. W. Pashley. *Proceedings of the Physical Society*, v. 65, sec. A, Jan. 1952, p. 33-38.

Presents some results obtained from an electron diffraction study (reflection technique) of evaporated deposits of silver and thallium halides on freshly cleaved surfaces of single crystals of rock salt, potassium bromide, magnesium oxide, and mica.

3339 The Effect of Dissolved Gases on the Tensile Strength of Liquids. C. G. Kuper and D. H. Trevena. *Proceedings of the Physical Society*, v. 65, sec. A, Jan. 1952, p. 46-54.

A theoretical investigation was made of the above. The tensile strength is assumed to be proportional to the surface energy of a vapor nucleus, which is further assumed to have the form of a product of a function of its radius and a function of the dissolved-gas concentration. 20 ref.

3340 A Note on Some Proposed Equations of State for the Expansion of Rigid Porous Solids on the Adsorption of

26. *Chemistry—General, Inorganic, and Physical*

Gases and Vapours. D. J. C. Yates. *Proceedings of the Physical Society*, v. 65, sec. B, Jan. 1, 1952, p. 80-81.

Derives thermodynamic equations for the above.

3341 Equilibrium Constants of the Heavier Hydrocarbons at Subatmospheric Pressure. M. Van Winkle. *Petroleum Refiner*, v. 31, Feb. 1952, p. 111-116.

Experimental work was done on vapor-liquid phase equilibria in systems containing dodecane, tetradecane, hexadecene, and octadecene. Experimental data on binary mixtures containing these compounds were used to develop K charts for each component covering the range 10-1000 mm. Hg absolute, and 100-700°F.

3342 Heat Transfer and Pressure Drop in Fixed Beds of Spherical and Cylindrical Solids. John M. Campbell and R. L. Huntington. *Petroleum Refiner*, v. 31, Feb. 1952, p. 123-131.

Packings with widely different physical and thermal properties were studied in several vertical cylinders in order to make the correlations as general as possible. A non-reacting system was used to keep the heat transfer independent of any reaction. The equations proposed are thus quite general when the flow is turbulent. 26 ref.

3343 Laboratory Continuous Stills—Apparatus and Operation. A. C. Wilcox, K. E. Coulter, and L. E. Lloyd. *Petroleum Refiner*, v. 31, Feb. 1952, p. 134-136.

Describes methods for control of small flows, and shows how to make continuous distillation a practical tool in the laboratory. Includes a complete discussion of apparatus and technique of operation.

3344* Nucleation in Phase Changes. R. S. Bradley. *Quarterly Reviews*, v. 5, no. 4, 1951, p. 315-343.

A comprehensive theoretical review. Numerous references.

3345* Some Applications of Radioactive Tracers to Physical Chemical Problems. John E. Willard. *Record of Chemical Progress*, v. 12, Fall 1951, p. 163-175.

Illustrates the effectiveness and versatility of the above tool by a description of some recent applications of tracers made by the author's research group at the U. of Wisconsin. 26 ref.

3346 Measurement and Control of the Level of Low Boiling Liquids. Aaron Wexler and William S. Corak. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 941-945.

Describes a simple, reliable, and generally applicable means for the above. The sensitive elements exhibit at least a 5-fold voltage difference for N_2 and at least a 500-fold difference for He depending on whether they are in the liquid or the vapor. Heat-transfer characteristics for liquid N_2 are also noted.

3347 The Thermal Decomposition of Barium Azide. J. G. N. Thomas and F. C. Tompkins. *Proceedings of the Royal Society*, ser. A, v. 210, Dec. 7, 1951, p. 111-125.

Presents results of a study of the above and of the effect of short-period pre-irradiation on this process. An explanation of nucleus formation in terms of double F-centers is given, and the importance of the slow growth of small nuclei in consideration of the mechanism of nucleus growth is emphasized. A theory of such growth is proposed. 12 ref.

3348 The Thermo-Osmosis of Gases Through a Membrane. 1. Theoretical. K. G. Denbigh and Gertrude Raumann. *Proceedings of the Royal Society*, ser. A, v. 210, Jan. 7, 1952, p. 377-387.

A theory is developed on the basis of Onsager's treatment of irreversible processes, and leads to equations giving rate of permeation and the pressure ratio at the stationary state. Magnitude of the effect depends on algebraic sum of heat of solution and heat of transport within the membrane. 22 ref.

3349 Study of the Light Metal Carbonyls Formed by the Reaction of Carbon Monoxide With Light Metals Dissolved in Liquid Ammonia. Arthur F. Scott. *Science*, v. 115, Feb. 1, 1952, p. 118-120.

Describes attempts to identify the above.

3350* Theoretical Bases of Vacuum Dessication. (In French.) L. Dunoyer. *Vide*, v. 6, July-Sept. 1951, p. 1025-1040; Nov. 1951, p. 1077-1090.

Presents mathematical analysis of evaporation of water or ice in a funnel through a tube connected to a condenser when a negligible pressure is encountered in the condenser. Shows how the time of evaporation varies as a function of various parameters. Data are tabulated and charted. (To be continued.)

3351* The Ge/GeO/GeO_2 System. (In German.) W. Bues and H.v. Wartenberg. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Nov. 1951, p. 281-288.

Reviews literature and describes experiments on above, in which it is shown that GeO is formed by vacuum sublimation of GeO_2 and Ge. Heat of formation and heat of decomposition were determined. Study of other properties includes comparison of thermodynamically with calorimetrically obtained heat effects and computation of normal entropies of GeO and GeO_2. Includes graphs, tables, diagrams, and references.

3352* The Mechanism of the Reduction of Cerium Dioxide. Remarks on the Work of G. Rienäcker and M. Birckenstaedt, and of G. Brauer and V. Holtschmidt. (In German.) Karl Hauffe and Horst Peters. *Zeitschrift für anorganische und allgemeine Chemie*, v. 266, Nov. 1951, p. 345-348.

Test results of above authors are explained by the gap theory, while Brauer's galvanic-effect explanation is found to be unconvincing. 10 ref.

3353* Boroxol Compounds. Preparation, Physical and Chemical Properties. (In German.) J. Goubeau and H. Keller. *Zeitschrift für anorganische und allgemeine Chemie*, v. 267, Dec. 1951, p. 1-26.

Above compounds resemble benzene in their 6-membered-ring structure, but alternate ring atoms are B and O. The benzene analogue, $B_3O_3H_3$, is unknown. However various compounds based on this structure have been prepared. Presents detailed information on preparation and properties of a number of them. 25 ref.

3354* Formation of Basic Salts From Solutions of Aluminum in Hydrochloric Acid. (In German.) Georg Denk and Liselotte Bauer. *Zeitschrift für anorganische und allgemeine Chemie*, v. 267, Dec. 1951, p. 89-96.

Shows that 6 times as much Al dissolves in boiling HCl than expected from the formation of $AlCl_3$. Addition of NaCl or $CaCl_2$ to this solution yields the basic chloride $Al_2(OH)_5Cl$ as a solid precipitate which is soluble in water. This compound, on reaction with Na_2SO_4, forms crystalline basic sulfate $[Al_2(OH)_5]_2SO_4$. Data are tabulated.

3355* The Chemistry of Columbium and Tantalum. VII. Note on the Binary System Columbium Pentachloride—Tantalum Pentachloride. (In German.) Harold Schäfer and Christel Pietruck. *Zeitschrift für anorganische und allgemeine Chemie*, v. 267, Dec. 1951, p. 174-180.

17 references.

3356* Electrochemistry of Fine-Pored Capillary Systems. IV. Dialysis Potentials. (In German.) Gerhard Schmid and Hans Schwarz. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie*, v. 55, Dec. 1951, p. 684-689.

Pores classified according to size in a series of collodion membranes were used to measure their analysis potentials in different concentrations of dilute KCl. It is shown that the measured values can also be computed accurately from the conductivities of the membranes. Includes diagrams, graphs, and tables. 10 ref.

3357* A New Thermal Constitution Diagram. Parts I and II. (In German.) Joseph Himpan. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 17-27, 130-135.

Study of above with 13 different gases includes critical examination of earlier constitution equations, method of deriving a new constitution equation, discussion of Boyle temperature, and computation of pressure dependence of specific heats. Generalization of results of Part I yields an additional constitution diagram which applies to all p,v,t values for all gases.

3358* The Influence of Nonconducting Inclusions on the Electroconductivity of Electrolytes. (In Russian.) V. P.

Mashovets. *Zhurnal Prikladnoi Khimii*, v. 24, Apr. 1951, p. 353-360.

The conductivity of electrolytes containing cylindrical and spherical nonconducting bodies was investigated experimentally and mathematically. Results are compared, tabulated, and charted.

3359* Isotherms of the Ternary System $MgO-P_2O_5-H_2O$. (In Russian.) S. Ia. Shpunt, A. P. Belopol'skii, and M. N. Shul'guna. *Zhurnal Prikladnoi Khimii*, v. 24, Apr. 1951, p. 404-412.

Data are tabulated, charted, and discussed.

Miscellaneous Publications

3360 Removal of Iodine From Aqueous Solutions by Sparging. C. H. Holm. U.S. Atomic Energy Commission, AECD-3202, June 11, 1951, 20 pages. (UF767 Un3m.)

Above studies show that iodine may be removed from nitric acid-uranyl nitrate solutions by air sparging when present initially as either iodide, iodine, or iodate—if means for conversion of non-elemental iodine to the zero oxidation state are provided. In the case of iodide, oxidation by HNO_3 appears to be adequate. At high concentrations of the acid, removal is impaired, possibly because of oxidation to iodate. A reducing agent such as an active metal is necessary to effect removal of iodate. Graphs and diagrams.

3361 Undissociated Species and Dimerization in Aqueous Solutions of Uranyl Fluoride. James S. Johnson and Kurt A. Kraus. U.S. Atomic Energy Commission, AECD-3236, Nov. 28, 1951, 4 pages. (UF767 Un3m.)

Activity coefficients for the above are calculated. Data are graphed.

3362 Enthalpy, Mean Heat Capacity, and Absolute Heat Capacity of Solid and Liquid Lithium. A. M. Cabbage. U.S. Atomic Energy Commission, AECD-3240, Mar. 31, 1950, 10 pages. (UF767 Un3m.)

The above were determined over the range of 500-1000°C. Data are tabulated.

3363 Hydrogen Liquefier Using Neon as an Intermediate. Charles B. Hood and E. R. Grilly. U.S. Atomic Energy Commission, AECD-3248, Sept. 28, 1951, 13 pages. (UF767 Un3m.)

A hydrogen liquefier is described in which the hydrogen is condensed at 5-6 atm. pressure by means of liquid Ne produced in a Joule-Thomson liquefier. Performance data are given. Diagrams.

3364 Compounds of Thorium With Transition Metals. I. The Thorium-Manganese System. John V. Florio, R. E. Rundle, and A. I. Snow. U.S. Atomic Energy Commission, AECD-3249, Aug. 24, 1951, 32 pages. (UF767 Un3m.)

Like U, Th forms no compounds with Cr, a few with Mn, the number increasing through Ni, and decreasing sharply with Cu. Reports in detail structures of the compounds of Th with Mn. Data are tabulated. Diagrams.

3365 Properties of Solids. Melvin A. Cook. Utah Engineering Experiment Station (Salt Lake City), Bulletin 53, Sept. 1951, 68 pages. (TA21 Ut1b.)

The above consists of 5 parts covering the following: empirical correlation of band properties of solids, thermal expansion and chemical bonding in homonuclear solids, compressibility of homonuclear solids, conductivity of metals, and an interpretation of non-classical energy relations in chemical bonds.

3366 Concerning a Pyrophoric Iron Oxide. F. Lihl. Henry Brutcher Translation 2702, 20 pages. (From *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 81, May 1950, p. 632-846.)

Presents a study on the preparation, properties, and structure of finely-powdered carbon-bearing iron oxides from ferrous formate and ferrous oxalate, which burn completely upon contact with atmospheric oxygen. Data are tabulated.

3367 A New Approach to Surface Chemistry and to Heterogeneous Catalysis. W. A. Weyl. Pennsylvania State College, Mineral Industries Experiment Station, Bulletin 57, 1951, 118 pages. (TN21 P38b.)

Attempts to formulate a basis for a proposed atomistic interpretation of chemical reactions which involve solid surfaces. 82 ref.

3368 Sodium. National Distillers Chemical Corp. (New York), 1949, 50 pages. (Pamphlet File.)

Coordinates important facts about the above. Includes a history of Na, its handling and storage, properties, industrial applications, and chemical reactions. 304 ref.

Books

3369 Physical Biochemistry. Henry B. Bull. 355 pages. 1951. John Wiley & Sons, New York. (QH345 B87p2.)

Presents an experimental approach to the above. Considerable stress is placed upon modern methods and instruments of research, including electrophoresis, light scatter, and the use of isotopes as tracer elements. Discusses such topics as dielectrics, electrokinetics, viscosity, diffusion, and membranes.

3370 Textbook of Electrochemistry. Vol. I and II. G. Kortüm and J. O'M. Bockris. 882 pages. 1951. Elsevier Publishing Co., New York. (QD553 K84Ltr.)

A comprehensive work on the above. Emphasis is on a clear understanding of fundamental principles. Important recent advances in the field are covered. Footnote references.

3371 A Treatise on Physical Chemistry. Vol. 2. Two States of Matter. Ed. 3. Hugh S. Taylor and Samuel Glasstone. 701 pages. 1951. D. Van Nostrand Co., New York. (QD453 T21t3.)

Contains the following: "The Kinetic Theory of Ideal Gases," Karl F. Herzfeld and Hugh M. Smallwood; "The Thermodynamics and Statistical Mechanics of Real Gases," James A. Beattie and Walter H. Stockmayer; "The Liquid State," George E. Kimball; "X-Ray Analysis of the Solid State," John G. White; and "The Colloidal State and Surface Chemistry," J. W. Williams, R. A. Alberty, and Elmer O. Kraemer.

See also:

2367 (chemistry of Mn-NH_3 complexes)
2624 (preparation of Mg telluride)
2659 (thermomagnetic analysis of catalysts)
2660 (longchain polar compounds—adsorption on metal surfaces)
2785 (high frequency detection of chromatographic zones)
2888 (light scattering for molecular studies)
2936 (flowmeter for radioactive liquids)
3000 (burning velocity of H_2-Br mixtures)
3025 (spectroscopic studies of H_2-O_2 explosion)
3068 (catalytic decomposition of peroxides)
3090 (determining catalytic and other properties of clays)
3123 (structure and rheology of stearate-cetane gels)
3189 (thermal diffusion for liquid separation)
3220 (calculation of physical-chemical data)
3231 (source book on fractional distillation)

27. CHEMISTRY—ORGANIC

3372* The Mobility of Hydrogen in Aromatic Compounds. (In Russian.) A. I. Shatenshtein, N. M. Dykhno, E. A. Izrailevich, L. N. Vasileva, and M. Faivush. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 479-482.

Heavy hydrogen was used to study the exchange of hydrogen between various hydrocarbons. Data are discussed and tabulated.

3373 Selective Hydrogenation of Polyolefins With Metal Sulfide Catalysts in the Liquid Phase. R. J. Moore, R. A. Trimble, and B. S. Greensfelder. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 373-375.

Use of the sulfides of Mo and Ni as liquid-phase selective hydrogenation catalysts is described; these materials were found to be highly selective for the above. They retain their activity in the presence of as much as 1% mercaptan or alkyl sulfide.

3374 The Interaction of Iodine With Cyclohexene and Vinyl Halides. L. J. Andrews and R. M. Keefer. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 458-460.

Spectrophotometric measurements have provided data from which the equilibrium constants for formation of certain complexes in hexane solution were calculated.

3375 Sodium Perborate as a Reagent in Organic Chemistry. I. Preparation of Azo-Compounds. S. M. Mehta and M.

27. *Chemistry—Organic*

V. Vakilwala. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 563-564.

Describes the oxidation of aniline and a number of its para-substitution products with sodium perborate in acetic acid as a solvent.

3376 Allylic Rearrangements. XXXIII. The Reaction of Sodium Allylbenzene With Allylic Halides and Methyl Bromide. William G. Young, Milton Kosmin, R. Y. Mixer, and Tod. W. Campbell. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 608-611.

The above was studied in liquid NH_3 to determine whether both the primary and secondary carbon atoms of the allylbenzene carbanion are involved in the displacement reaction. 12 ref.

3377 Diesters of Lactic Acid. Esterification of Lactates With Dibasic Acids. C. E. Rehberg and Marion B. Dixon. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 707-709.

26 esters made by the esterification of lactate esters with dibasic acids are described. Boiling points, refractive indices, densities, and viscosities of the esters at different temperatures are given. Potential usefulness of these compounds as plasticizers is suggested.

3378 The Action of Elementary Fluorine Upon Organic Compounds. XVII. The Direct Fluorination of Acetonitrile. John A. Cuculo and Lucius A. Bigelow. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 710-713.

Acetonitrile was fluorinated in the vapor phase over a Cu metal packing under a variety of operating conditions. Results are presented and discussed. 12 ref.

3379 Reactions of Polyfluoro Olefins. V. Chemical Properties of Anionic Addition Products. Karl E. Rapp, John T. Barr, Roy L. Pruett, Carl T. Bahner, J. Donald Gibson, and Robert H. Lafferty, Jr. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 749-753.

A variety of chemical reactions which normally involve the functional linkages of organic sulfides, ethers, and amines were investigated using the products of anionic addition of thiols, alcohols, and amines to polyfluoro-olefins. Results established the strong influence exerted by fluorine upon neighboring functional groups of organic, fluorine-containing compounds. 21 ref.

3380 A Comparative Evaluation of Several Antioxidants in Edible Fats. R. N. Moore and W. G. Bickford. *Journal of the American Oil Chemists' Society*, v. 29, Jan. 1952, p. 1-4.

13 compounds were intercompared with respect to their antioxidant activity in concentrations of 0.01, 0.05, and 0.10% in edible cottonseed oil; the same oil hydrogenated to shortening consistency; and in lard which is essentially free from naturally occurring antioxidants. 10 ref.

3381 Modification of Vegetable Oils. XII. Plasticity of Some Aceto Derivatives of Monostearin. R. O. Feuge, E. J. Vicknair, and N. V. Lovegren. *Journal of the American Oil Chemists' Society*, v. 29, Jan. 1952, p. 11-14.

Acetostearins were prepared by reacting various proportions of acetic anhydride with a monostearin of 99.2% purity, a commercially available monostearin containing 91.5% monoglycerides, and a technical grade monostearin containing 61% monoglycerides. The melting characteristics of the products were dependent on the purity of the monstearin used and the degree of acetylation. Data are graphed.

3382 Fatty Acid Amides. IV. Reaction of Fats With Ammonia and Amines. Edward T. Roe, Jeanne M. Stutzman, John T. Scanlan, and Daniel Swern. *Journal of the American Oil Chemists' Society*, v. 29, Jan. 1952, p. 18-22.

Conditions were worked out for quantitative conversion of oleo oil, olive oil, castor oil, and tobacco seed oil to amides and glycerol by reaction with liquid ammonia under pressure. 17 ref.

3383 The Effect of Trichloroethylene in the Hydrogenation of Soybean and Cottonseed Oils. F. A. Norris, K. F. Mattil, and W. J. Lehmann. *Journal of the American Oil Chemists' Society*, v. 29, Jan. 1952, p. 28-32.

Data are graphed.

3384* Problems of Preparative Photochemistry. (In German.) G. O. Schenck. *Angewandte Chemie*, v. 64, Jan. 7, 1952, p. 12-23.

Shows that purely photochemical reactions have a place in synthetic organic chemistry. Reactions which proceed via phototropic-isomeric diradicals are of particular importance. 31 ref.

3385 The Nature of the Products Obtained by Refluxing Styrene and Drying Oils in Xylol Solution. II. Additional Data on the Styrene-Tung Oil Reaction. H. Brunner and D. R. Tucker. *Journal of Applied Chemistry*, v. 1, Dec. 1951, p. 563-568.

In the conditions described, about 60% of the styrene remained unpolymerized and none formed a self-polymer. Only about 69% of the available elaeostearic groups took part in copolymer formation, the remaining 40% being recovered in a styrene-free form. 15 ref.

3386 Put Electro Organic Chemistry to Work. *Chemical Engineering*, v. 59, Jan. 1952, p. 150-152.

Discusses the possibilities of the industrial synthesis of organic compounds through liquid-phase electro-organic oxidation and reduction.

3387 Synthesis of Plant-Growth Regulators. Part I. Substituted β-Naphthyloxyacetic Acids. P. M. James and D. Woodcock. *Journal of the Chemical Society*, Dec. 1951, p. 3418-3421.

A number of mono-, di-, and trichloro-, and mononitro-β-naphthyloxyacetic acids were prepared for examination as parthenocarpic agents. New syntheses of 5-, 7-, and 8-chloro-2-naphthols are described.

3388 Polarographic Behavious of Iodo-Compounds. Part II. E. Gergely and T. Iredale. *Journal of the Chemical Society*, Dec. 1951, p. 3502-3507.

The polarographic reduction potentials of the iodobenzoic acids, iodoacetic acid, iodoanilines, and iodophenols in various media and buffers of controlled pH, were investigated. All of these compounds have half-wave potentials dependent on pH. Tentative explanations are given on their behavior. The influence of iodine on reduction potentials of nitro and other neighboring groups in the benzene ring is discussed.

3389* Vapour Phase Oxidation of Hydrocarbons. I. Surface Effects in the Low Temperature Oxidation of n-Heptane. A. Fallah, R. Long, and F. H. Garner. *Fuel*, v. 31, Jan. 1952, p. 4-18.

Two distinct maxima and minima have been found in the curves obtained by plotting peroxide and total aldehyde and ketone concentrations respectively against temperature. The reaction at low temperatures corresponding to the first peak in the peroxide-temperature curve was found to be influenced by the nature of the surface of the reaction chamber, oxidation being inhibited when the chamber is packed with Ni foil. The second peak in the peroxide-temperature curve was found to be independent of the surface material. 20 ref.

3390 The Acetylenic Esters. R. W. Moncrieff. *Industrial Chemist and Chemical Manufacturer*, v. 28, Jan. 1952, p. 29-33.

Methyl heptyne carboxylate is widely used by perfumers. Discusses several methods devised for synthesizing this substance and its homologues. 10 ref.

3391 Vapor Pressures and Distillation of Methyl Esters of Some Fatty Acids. Troy A. Scott, Jr., Duncan MacMillan, and Eugene H. Melvin. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 172-175.

The data presented indicate that methyl esters of successive even-numbered fat acids are readily separable by distillation, but that methyl esters of C_{18} unsaturated acids cannot be produced in the pure state by distillation equipment available at this time. A calculation was made of the number of theoretical plates required to separate consecutive pairs of saturated acid esters and the several pairs of C_{18} esters. 12 ref.

3392 Chlorination of Methane With Copper Chloride Melts; Ternary System Cuprous Chloride-Cupric Chloride-Potassium Chloride and Its Equilibrium Chlorine Pressures. C. M. Fontana, Everett Gorin, G. A. Kidder, and C. S. Meredith. **Oxygen Equilibrium Pressures and Oxide Solubility**

in the Melt. C. M. Fontana, Everett Gorin, G. A. Kidder, and R. E. Kinney. **Kinetics of Oxygen Absorption by the Melt.** C. M. Fontana, Everett Gorin, and C. S. Meredith. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 363-378.

Deals with the phase behavior in the above system. Tables, graphs, and diagrams. 30 ref.

3393 Construction of Ternary Phase Diagram for Liquid-Liquid Equilibria; System Benzene-Water-Trimethylamine. Howard E. Jones and William E. Grigsby. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 378-380.

Presents a study on the above. Diagrams and graphs are given.

3394 Hydroperoxide Oxidation of α-Dicarbonyl Compounds. John E. Leffler. *Journal of Organic Chemistry*, v. 16, Dec. 1951, p. 1785-1787.

The oxidations of benzoyldiphenylcarbinol and its methyl ether to benzophenone and benzoic acid were studied in the hope of throwing further light on the general problem of ketone oxidation. The result was of no theoretical sginificance. 15 ref.

3395 The Effect of Solvent and Temperature on the Base-Catalyzed Reaction of Styrene Oxide With Phenol. Cyrus O. Guss and Homer R. Williams. *Journal of Organic Chemistry*, v. 16, Dec. 1951, p. 1809-1816.

The base-catalyzed reaction of styrene oxide with phenol was shown to give different ratios of primary alcohol to secondary alcohol when the reaction environment and temperature were varied. This behavior is discussed in terms of structural considerations. 21 ref.

3396 Relations Between the Optical Rotatory Power and Structure of Polynuclear Natural Products. I. Steroid Hydrocarbons. William M. Stokes and Werner Bergmann. *Journal of Organic Chemistry*, v. 16, Dec. 1951, p. 1817-1828.

The relationship between the stereochemistry of the carbon skeletons of steroids and their optical rotatory power was discussed in terms of a simplified theory of optical activity and of the associated rules of van't Hoff, Freudenberg, Tschugaeff, and Marker. Data are tabulated. 39 ref.

3397 Autonomic Blocking Agents. I. Branched Aliphatic Quaternary Ammonium and Analogous Cyclic Ammonium Salts. Richard A. Robinson. **II. Alkamine Esters and Their Quaternaries.** Richard A. Robinson, and J. W. Cusic. *Journal of Organic Chemistry*, v. 16, Dec. 1951, p. 1911-1930.

24 references.

3398* Aromatic Selenenyl Sulfides. (In German.) Heinrich Rheninboldt and Ernesto Giesbrecht. *Justus Liebigs Annalen der Chemie*, v. 574, no. 3, 1951, p. 227-242.

Briefly reviews literature on the above and describes preparation and properties of several new types. 25 ref.

3399* Catalytic Dehydrogenation of Ethyl Naphthalene. J. C. Ghosh and S. Rama Das Guha. *Petroleum*, v. 15, Feb. 1952, p. 33-34.

The dehydrogenation of β-ethyl naphthalene to styrene was studied using various catalysts at atmospheric pressure. For determination of equilibrium conditions, the reaction was studied at pressures of 10-40 mm. and in the temperature range 360-510°C. Data are tabulated.

3400 The Chemical Effects of α Particles Upon Some C_6-Hydrocarbons in the Vapor State. Victor P. Henri, Charles R. Maxwell, William C. White, and Dorothy C. Peterson. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 153-155.

Some of the chemical effects of α-particles upon n-hexane, cyclohexane, cyclohexene, and benzene were determined. The hydrocarbons were mixed in the vapor state with radon and allowed to stand for several weeks. The resulting gaseous mixtures were analyzed by the use of a mass spectrometer. Some of the physical properties of the liquids formed in each case were also determined.

3401 Equilibria in the Halogenation of Some Organic Substances in Aqueous Solution. R. P. Bell, and E. Gelles. *Proceedings of the Royal Society*, ser. A, v. 210, Jan. 7, 1952, p. 310-322.

Describes measurements on the reversible iodination and bromination in aqueous solution of some ketones and similar substances, the equilibrium concentration of free halogen being determined by measurements of redox potentials. Examples were chosen to illustrate the scope of the method; in some of these, equilibrium constants have been determined with an accuracy of a few per cent, while in others only the order of magnitude could be determined. 23 ref.

3402 The Second Virial Coefficients of Mixed Organic Vapours. J. H. P. Fox and J. D. Lamber. *Proceedings of the Royal Society*, ser. A, v. 210, Jan. 22, 1952, p. 557-564.

Some of the above were measured at temperatures between 50 and 120°C. Mixtures of n-hexane with chloroform and of n-hexane with diethyl ether show a linear variation of second virial coefficient with composition.

3403* Organic Indium Compounds. (In German.) Franz Runge, Wolfgang Zimmermann, Harald Pfeiffer, and Irmtraud Pfeiffer. *Zeitschrift für anorganische und allgemeine Chemie*, v. 267, Dec. 1951, p. 39-48.

A series of the above were prepared with aid of the Grignard reaction and their properties compared with those of analogous compounds of neighboring elements of the periodic system. 19 ref.

3404* Methylcelluloses of Different Degrees of Polymerization and Effect on Polarographic Reductions. (In German.) Ludwig X. Holleck and Herbert J. Exner. *Zeitschrift für Naturforschung*, v. 6a, Dec. 1951, p. 763-767.

Describes experimental study of reduction of p-nitro aniline solutions, using methycelluloses polymerized to approximately 125, 200, 315, 500, and 590 units per molecule. Results show that, in equal concentrations by weight, the more severely reduced product has a greater polarographic effect than the higher-molecular-weight product. Data are charted.

Books

3405 The Lipids; Their Chemistry and Biochemistry. Vol. I. Harry J. Deuel, Jr. 982 pages. 1951. Interscience Publishers, Inc., New York. (QD751 D48L)

Presents a biological interpretation of the above. Includes their general characteristics and classification, chemistry of fatty acids and glycerol and various other fats.

3406 Hydrocarbons. *Discussions of the Farady Society*, no. 10, 1951, 338 pages. (TK1 F22d)

Consists of 30 papers by various authors covering the general topics of hydrocarbon structure and bond properties, thermal reactions, and oxidation reactions. Each broad section is followed by extensive general-discussion transcripts.

3407 Advances in Carbohydrate Chemistry. Vol. 6. Claude S. Hudson and Sidney M. Cantor, editors. 442 pages. 1951. Academic Press, New York. (QD321 A95)

Includes the following articles by various authors: Methyl Ethers of d-Galactose; Synthesis of Oligosaccharides; Formation of Furan Compounds From Hexoses; Cuprammonium-Glycoside Complexes; Chemistry of Ribose; 2-(Aldo-polyhydroxyalkyl) Benzimidazoles; Trends in the Development of Granular Adsorbents for Sugar Refining; Acoritic Acid, a By-product in the Manufacture of Sugar; Friedel-Crafts and Grignard Processes in the Carbohydrate Series; and Nitromethane and 2-Nitroethanol Syntheses. Chapter bibliography.

3408 Perkin and Kipping's Organic Chemistry. Vols. I-III. Rev. ed. F. Stanley Kipping and F. Barry Kipping. 1130 pages. 1950. D. Van Nostrand, New York. (QD253 P41p)

Comprehensive and up-to-date treatment of the above.

See also:

2765 (progress in purification of organic compounds)
2799 (organic reagents in inorganic analysis)
2836 (organic indicators—book)
3202 (isomerization of cyclohexane)
3335 (optical rotation of asymmetric organic compounds)
3353 (boroxol compounds)
3521 (linseed-oil chemistry)
3544 (synthesis of new-type organic fungicides)

28. PLASTICS AND HIGH POLYMERS

3409* The Kinetics of Copolymerization of 2,3-Dimethylbutadiene With Its Dimer and With Limonene. (In Russian.) P. K. Kogerman. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 11, 1951, p. 253-255.

The above was investigated experimentally. Results are discussed and tabulated.

3410 The Development of Crystallinity in Polychlorotrifluoroethylene. Fraser P. Price. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 311-318.

Crystalline regions in an amorphous polymer matrix are known to have profound effects on the mechanical, electrical, and optical properties of the polymer mass. Describes an investigation of above and some of the effects of this crystallinity on electrical, mechanical, and thermodynamic properties of the polymer.

3411 Allyl Polymerization. II. Decomposition of Benzoyl Peroxide in Allyl Esters. III. Kinetics of Polymerization of Allyl Esters. Norman G. Gaylord and Frederick R. Eirich. *Journal of the American Chemical Society*, v. 74, Jan. 20, 1952, p. 334-342.

Data are tabulated, charted, and discussed. 29 ref.

3412 The Effect of Oxygen on the Polymerization of Acrylonitrile. Kenneth C. Smeltz and Elizabeth Dyer. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 623-628.

Studies were made of the effect of oxygen on acrylonitrile in aqueous solutions with benzoyl peroxide, in bulk systems with benzoyl peroxide, and in photosensitized system with diacetyl as initiator. 20 ref.

3413 Polymerization of Styrene in the Presence of Fatty Acid Methyl Esters. L. B. Falkenburg, W. H. Hill, and Hans Wolff. *Journal of the American Oil Chemists' Society*, v. 29, Jan. 1952, p. 7-11.

Data on products obtained during the above are presented. These data show that no copolymerization between the esters and styrene occurs and that homogeneity of some of the reaction products cannot be considered as proof of interpolymerization. 23 ref.

3414 Mechanical Properties of Polymers at Ultrasonic Frequencies. Warren P. Mason and H. J. McSkimin. *Bell System Technical Journal*, v. 31, Jan. 1952, p. 122-171.

A number of different types of measuring methods are described which make possible propagation and impedance measurements not only in solid polymers, but also in liquid polymers and in solutions of polymer molecules in typical solvents. Data are graphed and tabulated.

3415 New Machine for Large Polythene Mouldings. *British Plastics*. v. 25, Jan. 1952, p. 10-13.

Describes performance and design of the above.

3416 Developments in the Barrel-Polishing of Plastics. *British Plastics*, v. 25, Jan. 1952, p. 24-25.

Describes the above. Factors to be considered are discussed.

3417 Phenolic Cements. *Chemical Engineering*, v. 59, Jan. 1952, p. 264, 266, 268-270, 272-274, 276-278, 280.

Discusses the above. Presents charts on the corrosion resistance of phenol-formaldehyde-resin cements with pure-carbon fillers.

3418 Trends in Industrial Piping. Will H. Shearon, Jr. *Chemical and Engineering News*, v. 30, Jan. 28, 1952, p. 316-321.

Surveys above as applied to the chemical industry. Covers metals, plastics, glass, ceramics, and their combinations—including coatings and linings. Data on mechanical and physical properties, sizes available, etc., are tabulated.

3419 Synthetic Polymers. J. C. Swallow. *Chemistry & Industry*, Dec. 29, 1951, p. 1158-1161.

Surveys the growth of the above industry. Briefly mentions methods by which polymeric structures can be modified.

3420 Wetting Characteristics of Cellulose Derivatives. I. Contact Angles Formed by Water and by Organic Liquids. F. E. Bartell and B. Roger Ray. *Journal of the American Chemical Society*, v. 74, Feb. 5, 1952, p. 778-783.

The above was determined by measuring the angle of contact of water and of various organic liquids against these derivatives. Fibers, rods, foils, films and coatings of the derivatives were used. A regular and systematic increase in the hydrophobic nature of the fatty-acid esters was found to occur with increase in length of hydrocarbon chain; also, with the acetate derivatives, increase occurred with increase in acetyl content. 13 ref.

3421 A Comparative Study of Persulphates and Benzoyl Peroxide as Initiators of Polymerization in Solution. Ranajit Sengupta and Santi R. Palit. *Journal of the Chemical Society*, Dec. 1951, p. 3278-3285.

Polymerizations of styrene, methyl methacrylate, and methyl acrylate initiated by persulfates and benzoyl peroxide, as homogeneous solutions in glycols, were compared.

3422 Degradation and Weathering of Plastics. A. R. Burgess. *Chemistry & Industry*, Jan. 26, 1952, p. 78-81.

Presents a unified picture of chemical mechanisms underlying the physical degradation during processing and weathering. 21 ref.

3423 Kinetics of Methacrylic Acid Polymerization in Aqueous Solution. A. Katchalsky and G. Blauer. *Transactions of the Faraday Society*, v. 47, Dec. 1951, p. 1360-1370.

Presents results of a study of the above. A mechanism for the reaction in agreement with experimental data obtained is suggested. 12 ref.

3424* Recent Development in Extrusion. H. E. Buecken. *India Rubber World*, v. 125, Jan. 1952, p. 435-437.

Discusses increased mechanization of process lines for plastics and rubbers, and machines which will combine operations previously requiring 2 or more different machines. Describes the Mil-Strainer, applicable to reclaimed rubber processing; and the Mil-X-Truder which permits simultaneous mixing and extruding of many rubber stocks and eliminates warm-up mills.

3425* Selected Plastics Literature References for the Mechanical Engineer, July, 1950-June, 1951. Gordon B. Thayer. *India Rubber World*, v. 125, Jan. 1952, p. 444-445.

Brief discussion under 12 subheads preceded list of 117 ref.

3426 Films Derived From Styrene-Maleic Anhydride and Styrene-Monoethyl Maleate Heteropolymers; Solubilities and Constitution. R. G. Heiligmann and E. E. McSweeney. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 113-116.

Describes development of a resinous adhesive which is water-dispersible and yet cures, ultimately, under relatively mild conditions, to a water-insoluble composition. Suggests application in the adhesive field or in the textile field.

3427 Sulfonyl Hydrazide Blowing Agents for Rubber and Plastics. B. A. Hunter and D. L. Schoene. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 119-122.

A new series of above agents for rubber and plastics is described and the best of these, p,p'-oxybis-(benzenesulfonyl hydrazide), is discussed in some detail. The compound appears to be nontoxic and, on heating in the range 130-160°C., produces nitrogen as the result of an internal oxidation-reduction reaction. The residue is polymeric, odorless, nonstaining, and nondiscoloring. The material has little effect on the cure rate and stability of rubber and plastics. Expanded products can be obtained from a variety of rubbers, plastics, and rubber-resin blends. They are characterized by a fine, uniform cell structure. Either closed- or open-celled products can be obtained, depending on processing techniques employed. Volume expansions of 10-15 fold can readily be realized. 12 ref.

3428 Silicon Oxyhydride. G. H. Wagner and A. N. Pines. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 321-326.

Silicon oxyhydride is the hydrolysis product of trichlorosilane with the empirical formula $SiHO_{3/2}$. Structurally it is a highly cross-linked polymer. Summarizes work which has been carried out in the Linde Laboratory on its preparation and properties.

3429 Precipitation Point in Phenolic Resins and Its Evaluation. K. B. Goldblum. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 359-362.

Defines and describes the above. Effect of nature of the catalyst on precipitation point is discussed. Data regarding effect of catalyst concentration, temperature, and substituent groups on the precipitation point are given.

3430* Condensation Plastics. George E. Morris. *A. M. A. Archives of Industrial Hygiene and Occupational Medicine*, v. 5, Jan. 1952, p. 37-43.

Discusses dermatological and chemical aspects of the above.

3431* Oil Pitch, a Plastic Material. (In French.) H. A. Sack. *Journal des Recherches du Centre National de la Recherche Scientifique*, no. 16, 1951, p. 21-30.

A comprehensive rheological study of the above is presented. Includes graphs and diagrams. 41 ref.

3432 Polymers and Copolymers of Acenaphthylene. J. Idris Jones. *Journal of Applied Chemistry*, v. 1, Dec. 1951, p. 568-576.

Some aspects of the copolymerization of acenaphthylene with styrene were studied and it was shown that a substantial elevation in the softening point of polystyrene results from the incorporation of acenaphthylene units in the polymer chain. The electrical properties of the copolymers are not significantly different from those of polystyrene. 22 ref.

3433* Trial Production of Cast Acrylic Photographic Filters. (In Japanese.) Haruzi Isikawa and Syuzi Sibata. *Journal of Mechanical Laboratory*, v. 5, July 1951, p. 101-106.

Specimens of acrylic filters were cast between two clean photographic glass plates packed with soft rubber. The attainable accuracy of cast molding of this resin was examined and the precision of optical qualities of cast acrylic filters compared with usual glass filters. It is shown that glass filters can be replaced by acrylic filters for ordinary purposes. Graphs and tables.

3434 The *p*-Phenylene Linkage in Linear High Polymers: Some Structure-Property Relationships. Owen B. Edgar and Rowland Hill. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 1-20.

Literature on the above is correlated and discussed. Includes graphs and tables. 29 ref.

3435 Comparative Properties of n-n' and l-n Polyamides. (In French.) A. Cannepin, G. Champetier, and A. Parisot. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 35-49.

Discusses the above, with emphasis on structural considerations. Data are tabulated and charted. 12 ref.

3436 Statistical Thermodynamics of Solutions of Low Molecular Weight Polystyrenes. H. Tompa. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 51-60.

Lowering of the vapor pressure of the solvent in solutions of low-molecular-weight polystyrenes in benzene and in toluene was measured by a differential manometer. Heats of dilution of the same solutions were measured in a small calorimeter. Results are analyzed theoretically. No satisfactory explanation can be given in terms of current statistical theories based on the lattice model. 20 ref.

3437 On Ionic Copolymerization. Yvan Landler. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 63-72.

Reactivity of monomers in an ionic copolymerization is shown to be a function of polarity of the substituent on the ethylenic double bond. The nonalternating tendency is explained by the absence of an alternating polar effect during the propagation step. 20 ref.

3438 A New Molecular Weight Distribution Technique for Polystyrene. I. Theory. Raymond F. Boyer. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 73-89.

Describes theory and preliminary practice of a technique which has been demonstrated to work with polystyrene. It will presumably hold for any soluble, homologous polymer whose distribution can be resolved by the conventional technique of fractional precipitation. It consists in observing the cumulative volume of precipitate corresponding to successive additions of nonsolvent to a dilute solution of the polymer. 37 ref.

3439 Cross-Linking in the Polymerization of Vinyl Benzoate and Related Compounds. George E. Ham and Eugene L. Ringwald. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 91-98.

Branching and cross-linking were noted in emulsion and mass polymerizations involving above compounds. A theory is proposed to account for this phenomenon based on free-radical addition to the benzoate nucleus. 6 new vinyl esters of substituted benzoic acids are described.

3440 Study of the Phenomenon of Dissolution of Polyvinyl Chloride. (In French.) Jacques Corbiere, Pierre Terra, and René Paris. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 101-109.

Presents certain results concerning the solubility of polyvinyl chloride in mixed solvents of which one is CS_2 or acetone. The technique consists in immersing a pressed disc of the polymer in the mixed solvent at constant temperature for a fixed length of time and observing the depth of penetration of the solvent into the sectioned disc. Three classes of solvents are distinguished.

3441 Absolute Propagation Rates in Emulsion Polymerization. I. Butadiene in Mutual System. Maurice Morton, P. P. Salatiello, and H. Landfield. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 111-120.

Presents results of experimental investigation of the above.

3442 A Note on Chain Polymerization Reactions. John Murphy and Albert Wassermann. *Journal of Polymer Science*, v. 8, Jan. 1952, p. 123-125.

Presents mathematical procedure for study of kinetics of the above.

3443 Mechanical Properties of Discrete Polymer Molecules. W. O. Baker, W. P. Mason, and J. H. Heiss. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 129-155.

As relation of intrinsic viscosity and flow birefringence on shearing stress have indicated, and a host of other polymer properties has implied, single chains in solution have dynamic shear rigidity. Polyisobutylene chains show a large increase in stiffness at frequencies above 10^5, which seems especially to come from restriction to rotation around valence bonds. 36 ref.

3444 The Polymerization of Cyclopropane. R. J. Scott and H. E. Gunning. *Journal of Physical Chemistry*, v. 56, Jan. 1952, p. 156-160.

A study was made of the physical and chemical properties of the polymer produced by the reaction of cyclopropane with Hg $6(^3P_1)$ atoms at 30° in a static system. Infrared studies suggest that the polymer is a mixture of cycloparaffins. Results indicate that the polymethylene biradicals terminate by cyclization.

3445 Catalytic Conversion of a Diene Into Deeply Colored Polymers. B. Eisler, S. D. Farnsworth, E. Kendrick, R. Schnurmann, and A. Wassermann. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 157-161.

Results of investigation show that cyclopentadiene can be catalytically converted, at room temperature, into a deep red polycyclopentadiene-trichloroacetic acid adduct, the yield being, under suitable conditions, over 90% of theoretical.

3446 Statistics of Linear Macromolecules With a Relatively Short Chain. IV. Molecular Dimensions From Viscosity and Sedimentation. A. Peterlin. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 173-185.

Data on the above are presented graphically.

3447 Some Types of Organic High Polymers and Permutoids Provided With Active Groups: Their Synthesis, Optical Properties, and Reactivity. W. Lautsch, W. Broser, W. Rothkegel, W. Biedermann, U. Doering, and H. Zoschke. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 191-213.

21 references.

3448 Absolute Propagation Rates in Emulsion Polymerization. II. Butadiene in Hydroperoxide-Polyamine Systems. Maurice Morton, P. P. Salatiello, and H. Landfield. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 215-224.

Reports results of an investigation on the above. Data are graphed and tabulated.

28. *Plastics and High Polymers*

3449 Relation of Composition of Polyvinyl Acetals to Their Physical Properties. I. Acetals of Saturated Aliphatic Aldehydes. Andrew F. Fitzhugh and Robert N. Crozier. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 225-241.

Presents results of a study of effects of "internal plasticization" in polyvinyl acetals produced by using aldehydes of increasing molecular weight. Graphs and tables. 10 ref.

3450 Some Copolymers of Dimethyl 1-Propene-2-Phosphonate and of 1-Phenylvinylphosphonic Acid. C. S. Marvel and John C. Wright. *Journal of Polymer Science*, v. 8, Feb. 1952, p. 255-256.

Reports on the above.

3451* Rheological Studies of Solvent-Free Polymerization. (In German.) Walter Scheele. *Kautschuk und Gummi*, v. 4, Aug. 1951, p. 282-293; Dec. 1951, p. 447-456.

Referring to experimental results published in other periodicals, theories on the behavior of elastic-viscous substances towards mechanical deformation and on the non-Newtonian flow of solvent-free polymerizates are discussed. Includes diagrams, tabular data, and graphs. Part II discusses additional possibilities of presenting and interpreting flow curves of substances in the non-Newtonian range. The concluding part describes a method that can be used to advantage in evaluating non-Newtonian flow phenomena. 82 ref.

3452* The Mechanical Nature of the Size Reduction of Macromolecules by Ultrasonic Vibrations. (In German.) G. Schmid, G. Paret, and H. Pfleiderer. *Kolloid Zeitschrift*, v. 124, Dec. 1951, p. 150-159; disc., 159-160.

Fractionation tests of polymethacrylic acid methyl ester dissolved in chloroform and subjected to ultrasonic vibrations show that the polymers are more uniform and thus prove the mechanical nature of this reducing method. Data are graphed and tabulated. Numerous references.

3453* Dielectric Behavior of Synthetic Resins. (In German.) F. Horst Müller. *Kunststoffe*, v. 41, Sept. 1951, p. 277-283.

Shows that dielectric constant and loss angle are closely related to structure and to other groups of properties which can be expressed with the aid of the formulas of the dipolar theory. Graphs and diagrams. 20 ref.

3454* Measuring Elasticity and Viscosity of Molten Polyethylene. (In German.) E. A. W. Hoff. *Kunststoffe*, v. 41, Dec. 1951, p. 413-414.

Shows that the usual methods of determining viscosity cannot be applied to high polymers and describes a resonance method, application of which is demonstrated on polyethylene. Includes a diagram.

3455* Plastic Working on Continuous Worm-Shaft Machines. (In German.) S. Kiesskalt. *Kunststoffe*, v. 41, Dec. 1951, p. 414-416.

Describes and illustrates different designs of mixing and kneading machines for plastic materials. 12 ref.

3456* Mode of Action of the Worm-Shaft Extrusion Press. (In German.) Walter Meskat. *Kunststoffe*, v. 41, Dec. 1951, p. 417-421.

Shows that efficiency of above with respect to output rate, kneading, mixing, or homogenizing action of the extruded materials, and of energy consumption, requires a thorough study of rheological conditions. The rheology of the material and the flow curves can be used to compute the characteristic curves of worm gears and the energy consumption. Diagrams, graphs, and tabulated equations and constants are given.

3457* Technique of Aplying the Mixed Polymers of Assymmetrical Dichloroethylene and Vinylchloride. (In German.) Paul Kränzlein. *Kunststoffe*, v. 41, Dec. 1951, p. 421-428.

Describes advance of systematic experiments on above, including discussions on properties, uses and processing methods for polymers. Illustrations and tables. 11 ref.

3458* The Use of Polyvinyl Alcohol and Polyvinyl Acetal. (In German.) Georg Schulz. *Kunststoffe*, v. 41, Dec. 1951, p. 429-431.

Production, properties, and uses of above as plastic materials are discussed. Data are tabulated.

3459* Advances in Injection-Molding Techniques and in Injection-Molding Composition of the Polystyrene, Polyethylene, and Polyamide Types. (In German.) Hans Beck. *Kunststoffe*, v. 41, Dec. 1951, p. 431-434.

Discussion of economics, machines, and compositions suitable for injection molding also includes a study on methods of eliminating several frequent defects in molded polystyrene parts. Graphs, tables, and diagrams.

3460* Recent Developments in the Field of Cellulose-Ester Compositions for Injection Casting. (In German.) W. Röhm. *Kunststoffe*, v. 41, Dec. 1951, p. 434-437.

Discusses structure, properties, and use of the different types of above compositions and describes methods of processing and finishing such compositions. Data are tabulated.

3461* Problem of Glueing Synthetic Resins. (In German.) Hansjürgen Saechtling. *Kunststoffe*, v. 41, Dec. 1951, p. 447-448.

Presents a few practical suggestions on above.

3462* Glueing Of and With Synthetics. (In German.) Otto Jordan. *Kunststoffe*, v. 41, Dec. 1951, p. 451-454.

Discusses the various methods of joining different synthetics or of synthetics with non-synthetic materials. Data are tabulated.

3463* New Polyadducts and Their Possible Industrial Uses. (In German.) Hans Orth. *Kunststoffe*, v. 41, Dec. 1951, p. 454-457.

Brief discussion on production, properties, and processing of polyester cycloacetals. Includes structural formulas, graphs, and tables.

3464* Experiences on the Processing and Application of "Araldite" As Binder and Casting Resin. (In German.) Konrad Meyerhans. *Kunststoffe*, v. 41, Dec. 1951, p. 457-462.

Shows that excellent mechanical, electrical, and chemical properties of Araldite makes it suitable material for a wide range of articles and uses. Includes photographs and tables.

3465* Possibilities of Welding Foils by Use of High-Frequency Heating. (In German.) Tankred von Hauteville. *Kunststoffe*, v. 41, Dec. 1951, p. 466-470.

Describes procedure and advantages of high-frequency, and press welding of plastic foils and shows that most suitable method of welding depends on the thickness of material. Diagrams, photographs, and graphs.

3466 Thin Hollow Plastic Shapes Produced by Automatic Blow Molding. J. H. Du Bois. *Materials & Methods*, v. 35, Feb. 1952, p. 88-90.

Describes the above process and discusses its scope.

3467* Technique Used in Producing Plastic Tooling for Aircraft. P. Lercy Venable. *Machinery* (American), v. 58, Jan. 1952, p. 156-160.

Described and illustrated.

3468* The Chemical Stability of Plastics. (In German.) Richard Reichherzer. *Mitteilungen des Chemischen Forschungsstitutes der Industrie Österreichs*, v. 5, Dec. 1951, p. 108-110.

Effects of 14 different instances on 25 different plastics are summarized in tabular from.

3469 An Alkyd With Muscles. *Modern Plastics*, v. 29, Feb. 1952, p. 84-85.

Alkyd resin and Fiberglas reinforcement were combined to produce a new molding compound which has higher impact strength than any other plastic molding material. The new compound, which can be compression or transfer molded, was recently announced by Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio.

3470 Effect of Extruder Variables on Properties and Output of Polyethylene Film. W. A. Haine and W. M. Land.

Modern Plastics, v. 29, Feb. 1952, p. 109-110, 112, 116, 118, 120, 196-197.

Experiments were designed to show what variations in physical properties of extruded thin polyethylene film are produced by variations in extruder, die, and cooling bath, using a flat, thin-film die. The most advantageous operating conditions for increasing of film output of a given extruder at a high quality level were determined. Data are graphed and tabulated.

3471 Alkyd Resins as Engineering Materials. Myron A. Coler and Sidney Lauren. *Organic Finishing*, v. 13, Jan. 1952, p. 15-19.

Discusses theory of functionality, development, properties, application, and future of the above.

3472 Analytical Chemistry of Nitrogenous Coating Resins. C. P. A. Kappelmeier. *Paint, Oil & Chemical Review*, v. 115, Jan. 17, 1952, p. 14, 16, 18, 42, 46, 48-49.

Describes some aspects of the chemistry of urea, melamine, and related resins. Stresses the identification of these nitrogenous resins.

3473 On the Torsional Vibrations of Long Chain Molecules. B. Szigeti. *Proceedings of the Physical Society*, v. 65, sec. B, Jan. 1, 1952, p. 19-32.

Simplified models are discussed for long-chain molecules in which all units are equal except for one which is heavier than the others. Certain general conclusions are reached for the vibrations of such molecules.

3474* Ethoxyline Resins. E. Preiswerk. *Plastics*, Jan. 1952, p. 6-10.

Discusses the application of synthetic-resin adhesives of above type. Graphs, diagrams, and illustrations. (To be continued.)

3475 Now: Nylon Parts for Ball Bearings. F. W. Recknagel. *Product Engineering*, v. 23, Feb. 1952, p. 119-123.

Discusses the above application for nylon and lists its advantages and properties, several of which are: noise reduction, resistance to corrosion and wear, low coefficient of friction, and adaptability to lubricating conditions.

3476* New Plastic Glazings Offer Possibilities for Railway Use. *Railway Engineering and Maintenance*, v. 48, Jan. 1952, p. 60-62.

Discusses features of newly developed light-transmitting materials which have a number of advantages over glass.

3477* Polyalkylene Sulfides. C. S. Marvel. *Record of Chemical Progress*, v. 12, Fall 1951, p. 185-189.

The reaction of dithiols with nonconjugated diolefins was shown to be a very general reaction and yields polymers with a wide variety of properties. Rubbers, film-forming polymers, and even fibers seem to be possible products from the reaction. 14 ref.

3478 An X-Ray Spectrometer for Polymer Studies. Samuel Krimm and Richard S. Stein. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 920-925.

A Geiger counter x-ray spectrometer was designed and constructed for the quantitative study of crystallinity and orientation in polymers and of relaxation phenomena associated with these properties. The spectrometer, pertinent techniques, and typical results are described.

3479* The Application of Plastics to Aircraft. R. A. R. Black. *Journal of the Royal Aeronautical Society*, v. 56, Jan. 1952, p. 47-56.

Surveys the above.

3480 The Photo-Degradation of Polymethylmethacrylate. I. The Mechanism of Degradation. P. R. E. J. Cowley and H. W. Melville. *Proceedings of the Royal Society*, ser. A, v. 210, Jan. 22, 1952, p. 461-481.

On exposure to ultraviolet light of wavelength 2537 A, polymethylmethacrylate degrades rapidly to monomer at temperatures above 130°C. in vacuo. The general features of this reaction are described, and the behavior of polymethylmethacrylate compared with that of other vinyl polymers under similar conditions. 13 ref.

3481 Resistance of Floor Coverings to Grease, Oils and Selected Reagents. *Rubber Age*, v. 70, Jan. 1952, p. 477-478.

Discusses briefly, and presents tabulated data giving results of tests on the above. Materials tested range from vinyl, rubber, linoleum, asphalt, and printed enamel to several proprietary materials.

3482* Heats of Solution and Swelling of Some Synthetic High-Molecular Compounds. A. Tager and V. Sanatina. *Rubber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 773-776. (Translated and condensed from *Kolloidnyi Zhurnal*, v. 7, June 1950, p. 474-477.)

3483* A Proposal for Establishing Certified Injection Molding Machine Specifications. David J. Sloane. *SPE Journal*, v. 8, Jan. 1952, p. 7-10.

An injection molding machine consists of a system for clamping molds and a system for melting thermoplastics and forcing them into the molds. Recommends establishment of specifications for these features. Emphasizes need for precise methods for determining these specifications.

3484* The Use of Air-Gap Insulation in Plastic Molds. William Kosobud. *SPE Journal*, v. 8, Jan. 1952, p. 11-12.

Proposes the use of air-gaps or dead air spaces within molds so as to insulate certain portions from other temperature zones within the mold. Schematic diagrams.

3485* A Compound Curved Honeycomb Core Material for Sandwich Panel Construction. Austin H. Herbst. *SPE Journal*, v. 8, Jan. 1952, p. 13-14, 22.

Describes the "Kontour-Kore" process for production and fabrication into compound curved shapes of a low-density core material which does not have the limitations of the core materials previously described. 34 ref.

3486 3 Requisites for Adhesives. Seth Gunthorp. *SAE Journal*, v. 60, Jan. 1952, p. 53-54. (Excerpts from "Adhesion Engineering," by Seth Gunthorp.)

To obtain a high quality adhesive bonded joint, an adhesive must fulfill these 3 requirements: the surfaces to be bonded must be wet by the adhesive, the adhesive must solidify, and the solid must be strong and tough over a useful range of temperature and other service conditions. These requirements are explained.

3487* Polyamide Resins for Paper Coating. Harold Wittcoff, M. M. Renfrew, and Fred B. Speyer. *Tappi*, v. 35, Jan. 1952, p. 21-29.

Above resins are suited for paper coatings because they impart heat-sealing properties as well as resistance to water vapor, grease, solvents, and chemicals. Three basic types of resins are available, and all 3 may be coated as hot melts, as solvent solutions, and as water dispersions. Discusses the compatibility relationships of both the solid resin and the suspensoid form. 12 ref.

3488* Preheating of Thermosetting Molded Plastics. (In German.) H. Stäger. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93, Nov. 1, 1951, p. 965-972.

Reports results of investigations of phenol, urea, and melamine-base polymers. Dielectric heating of very short duration proved of particular value. Data are tabulated and charted. Micrographs illustrate structure of filled articles.

3489* Glueing With Thermosetting Resins. (In German.) H. Stäger. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 93, Nov. 21, 1951, p. 1045-1047.

Describes application of above process to wood using dielectric heating. Advantages and economics are discussed. Tables, charts, and photographs.

See also:

2453 (Co-polymers used to impregnate castings)
2555 (metallizing plastic materials)
2713 (method of determining endurance limit of plastics)
2765 (chemical progress in study of high polymers)
2977 (ordnance application of plastic)
3039 (use of polymers in air filters)
3135 (plastic bearings—Russian book)
3152 (thread locking with plastic)
3318 (interaction of nylon with NaOH)

28. *Plastics and High Polymers*

3377 (diesters of lactic acid as plasticizers)
3385 (styrene–tung-oil reaction)
3502 (rubber-phenolic combinations)
3600 (sheet polarizing materials)
3648 (butyl insulation for transformers)
3650 (polymeric dielectric materials)
3686 (resin embedment of transistors)

29. RUBBERS AND OTHER ELASTOMERS

3490 Silicone Rubber for High Speed Flight. Burton B. White. *Aero Digest*, v. 64, Jan. 1952, p. 34-36, 38, 42, 44, 47.

Describes the physical properties of the above. Applications are given in detail.

3491* Fabricating Sheet-Rubber. *Aircraft Production*, v. 14, Feb. 1952, p. 38-41.

Describes technique used by Wilkinson Rubber Linatex, Ltd. for the manufacture of intricate parts. Apparatus is diagrammed.

3492* Diffusion of Oxygen and "Rubber Oxides" in the Presence of Phenyl-β-Naphthylamine. (In Russian.) A. S. Kuz'minskii, L. L. Shanin, and N. N. Lezhnev. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 467-470.

The above was studied from a mathematical point of view, also experimentally. Results are discussed, tabulated, and charted.

3493* A Test for Crystallization Effects in Rubbers. J. R. Beatty. *India Rubber World*, v. 125, Jan. 1952, p. 438-439.

Discusses a test developed for measuring the stiffening of rubber-like materials at low temperature due to crystallization. These measurements are easily performed in existing cold boxes and use any simple tensile specimen. Typical measurements and results for 4 polymers are shown.

3494* Selected Rubber References for the Mechanical Engineer, July, 1950-June, 1951. R. E. Shrader and R. M. Turner. *India Rubber World*, v. 125, Jan. 1952, p. 440-442.

Textual discussion precedes list of 40 ref.

3495 Oxidation of Unvulcanized Cold Rubber; Influence of Adsorption by Carbon Black. C. W. Sweitzer and Francis Lyon. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 125-131.

Previous investigations have shown a large difference between the amount of rubber insolubilized by carbon black in dilute solvent systems and in standard mill mixes. These extremes are reconciled, and the role of adsorption in the insolubilization of rubber in mill-mixed compounds is evaluated. An adsorption test was employed which eliminated the solvent effect of the dilute system and the mastication effect in mill mixing. Results showed that carbon black, depending on the temperature and atmosphere conditions imposed on the rubber-carbon films, represses scission, cross-linking, and gelation reactions of GR-S X-478. This approach offers possibilities of providing additional information on the mechanism of the carbon-rubber bond.

3496 Carbon Black Differentiation by Electrical Resistance of Vulcanizates. John E. McKinney and Frank L. Roth. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 159-163.

Electrical resistivities of GR-S vulcanizates containing various channel and furnace blacks were measured in order to determine whether this property could be used as a criterion for distinguishing between different blacks. These measurements show large differences between different brands of black from the same type and between different types, and are highly sensitive to various factors in preparation and handling of the test sheets.

3497 Lignin-Reinforced Nitrile, Neoprene, and Natural Rubbers. J. J. Keilen, W. K. Dougherty, and W. R. Cook. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 163-167.

Compounds prepared from master batches of lignin and nitrile, neoprene, and natural rubbers have physical properties comparable with and in some cases superior to those obtained with carbon black. Lignin-reinforced rubber compounds were found to be comparable in physical properties to those containing inorganic pigments. Tables and graphs.

3498 Modulus and Relaxation of Elastomers in Torsion at Low Temperatures. Melvin Mooney and W. E. Wolstenholme. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 335-342.

Thermal stress measurements were made on a few elastomers at temperatures extending down to close to Ts 2nd-order transition temperatures. 11 ref.

3499 Statistical Thermodynamics of Rubber Elasticity. Frederick T. Wall and Paul J. Flory. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1435-1439.

Attempts to clarify the currently prevalent confusion with respect to theory of rubber elasticity. 12 ref.

3500 Statistical Theory of Rubber-Like Elasticity. IV. (Two-Dimensional Stretching). Akira Isihara, Natsuki Hashitsume, and Masao Tatibana. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1508-1512.

A mathematical treatment.

3501 Rheology of Synthetic Latex. 1. Test of Some Flow Equations. Irvin M. Krieger and Samuel H. Maron. *Journal of Colloid Science*, v. 6, Dec. 1951, p. 528-538.

Presents, in fundamental terms, the definition of the flow behavior of latex. Mathematical analysis.

3502 Why Rubber-Phenolics? *Modern Plastics*, v. 29, Feb. 1952, p. 71-77.

Discusses properties of the above. Greater impact strength, improved vibration fatigue, greater thermal-shock resistance, and ease of moldability are some of the advantages offered. Applications are described.

3503 Engineering Uses for Rubber Adhesives. R. S. Piper. *Product Engineering*, v. 23, Feb. 1952, p. 130-133.

Discusses the above, giving application techniques and comparison of properties of various rubbers. Includes use for metal bonding.

3504 What You Should Know About Hard Rubber. A. J. Lorenz. *Product Engineering*, v. 23, Feb. 1952, p. 168-172.

Lists outstanding characteristics, methods of forming, applications, and design factors. Illustrations and tabulated data.

3505 Studies in the Dispersion of SRF Carbon Black in Butyl Rubber. F. P. Ford and A. Y. Mottlau. *Rubber Age*, v. 70, Jan. 1952, p. 457-463.

A simple method is described for producing different degrees of carbon black dispersion in elastomers under controlled laboratory conditions. A new technique is described for studying these dispersions in rubber by means of the electron microscope. Representative electron micrographs are shown. Some practical and theoretical implications are discussed.

3506* The Rubber Hydrocarbon in Freshly Tapped Hevea Latex. George F. Bloomfield. *Rubber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 737-749.

Summarizes the results of investigations recently carried out in Malava on the above, with respect to its molecular weight, as obtained by viscometric and osmotic measurements, and molecular-weight distribution as revealed by fractionation. 22 ref.

3507* Molecular Aggregation in Amorphous Polymers. V. I. Kasatochkin and V. V. Lukin. *Rubber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 763-766. (Translated from *Doklady Akademii Nauk SSSR*, new ser., v. 77, Mar. 1, 1951, p. 81-84.)

Discusses above from the fundamental, theoretical viewpoint, with emphasis on elastomers.

3508* Determination of the Structure of Rubbers by Infrared Spectroscopy. M. P. Burgova and A. A. Korotkov. *Ruber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 756-762. *(Translated from Izvestiia Akademii Nauk SSSR* Physics Series, v. 14, no. 4, 1950, p. 452-457.)

Describes procedure. Typical data are tabulated and charted.

3509* Relaxation Processes in the Deformation of Unloaded Rubbers and the Influence of the Degree of Vul-

canization. D. A. Dogadkin and M. N. Reznikovskii. *Rubber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 810-819. (Translated from *Kolloidnyi Zhurnal*, v. 13, no. 1, 1951, p. 11-19.)

Shows that stress relaxation at different initial elongations as well as deformation at constant rate for unloaded rubbers at different temperatures (20-70°C.) can be represented quantitatively by equations suggested in earlier works. Likewise the possibility of expanding the theories proposed for the kinetics of high-elastic deformation of spatial polymers is substantiated. It is also shown that the relaxation properties of soft unloaded vulcanizates of natural rubber and many synthetic rubbers do not undergo essential changes during vulcanization. 10 ref.

3510* The Effect of Sulfur on the Oxidation of Sodium-Butadiene Rubbers. A. S. Kuzminskii, T. G. Degteva, K. A. Lapteva, and N. N. Lezhnev. *Rubber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 853-856. (Translated from *Doklady Akademii Nauk SSSR*, new ser., v. 75, Nov. 11, 1950, p. 223-226.)

Previously abstracted from original.

3511* The Transformation of Thiols Compounded in Raw Rubber. Jean le Bras and Michel Montu. *Rubber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 914-915. (Translated from *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Jan. 5, 1951, p. 82-84.)

Outlines results of ultraviolet absorption spectroscopic investigation of the above.

3512* Butadiene and Its Polymers. V. Formation of Spongy Butadine Polymer. K. I. Piotrovskii. *Rubber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 916-920. (Translated from *Zhurnal Prikladnoi Khimii*, v. 22, no. 5, 1949, p. 518-523.)

Shows that the formation of spongy butadiene polymer is accelerated by addition to the butadiene of most metals and certain crystalline substances. This spongy polymer is not formed on lead or copper. Formation of spongy polymer on iron takes place at practically any polymerization temperature. In the absence of oxygen and peroxides, no spongy polymer is formed. An outline scheme of the thermal polymerization of butadiene is given, with experimental data on the formation of its cyclic dimer, of a rubber like polymer, and of the spongy polymer.

3513* The Sulfonation of Natural Rubber. G. J. van Amerongen. *Ruber Chemistry and Technology*, v. 24, Oct.-Dec. 1951, p. 921-923. (Translated from *Revue Générale du Caoutchouc*, v. 27, Dec. 1950, p. 731-732.)

Previously abstracted from original.

3514* Bentonite in Flow-Casting. E. J. Tjebbes and J. V. VanUlden. *Rubber Developments*, v. 4, Dec. 1951, p. 118-120.

By adding bentonite in a quantity dependent on the kind of latex used, latices that do not form a layer of sufficient thickness on the plaster mold can be improved to such a degree that at room temperature in 30 min. a deposition of 1.5 mm. may be obtained from an uncharged compound. Data are tabulated and charted.

3515* Determination of Individual Mineral Fillers in Rubber Mixtures. (In German.) H. E. Frey. *Fresenius' Zeitschrift für analytische Chemie*, v. 134, no. 5, 1952, p. 352-360.

Description of procedures includes discussion of ashing temperature and description of an attachment to the large colorimeter. Data are tabulated. 35 ref.

See also:

2493 (rubber-metal bonding)
2941 (load-deflection testing of elastomers)
2977 (ordnance application of rubber)
3188 (cold-rubber production by Phillips Chemical Co.)
3424 (extrusion equipment for rubber)
3427 (blowing agents for rubber)
3477 (rubber from polyalkylene sulfide reactions)
3481 (rubber in floor coverings—grease resistance)

30. PAINTS, VARNISHES, LACQUERS, AND ENAMELS

3516 Hardness, Abrasion Resistance and Accelerated Weathering Tests on Pure and Unpigmented Paint Vehicles. Parts I and II. Ewin B. Kiser and J. H. Coulliette. *American Paint Journal*, v. 36, Jan. 28, 1952, p. 64-66, 68-72, 74; Feb. 4, 1952, p. 68, 70, 72, 74, 76, 78, 80, 82, 84, 86.

Part I describes the testing procedure and results of tests obtained on the above. Part II presents curves showing loss of weight vs. time for clear compounds. A synopsis of appearance of clear compounds is given as well as data on hardness and abrasion resistance.

3517 Fundamentals of Aluminum Paint. Ernest Scheller. *American Paint Journal*, v. 36, Feb. 18, 1952, p. 82, 84-85, 88-89, 92-93.

Covers the theories, fundamentals, and functions of Al paint. Stresses the pigment and its behavior in the varnish, lacquer, or synthetic solution.

3518 Colourless Lacquers as Plating Reinforcements. *Metal Industry*, v. 80, Jan. 25, 1952, p. 67-69.

Presents a discussion on the above given by the Midlands Centre of the Institute of Metal Finishing.

3519 Diffusion of Sodium Chloride Through Various Paint Systems. W. W. Kittelberger and A. C. Elm. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 326-329.

Development of a method for determination of instantaneous rate of diffusion of electrolytes through such organic membranes as paint films is described. Application of this method to the systematic study of the diffusion of NaCl through a number of paint coatings, including representative metal-protective paint systems is then described.

3521 Conjugated Linseed Oil. J. J. A. Blekkingh, N. M. H. Blonk, and H. A. Boekenoogen, *Paint, Oil & Chemical Review*, v. 115, Feb. 14, 1952, p. 18, 20, 22, 24, 26.

Discusses chemical changes effected in the above through various treatments. Applications for isomerized linseed oil in the paint and enamel industry are given. 11 ref.

3522 Fused Zinc Resinates From Aldehyde-Modified Rosin. William E. St. Clair and Ray V. Lawrence. *Industrial and Engineering Chemistry*, v. 44, Feb. 1952, p. 349-351.

Describes a simple method of preparing the above.

3523* Exposure Test No. 1: Comparison of Calcium and Barium Compounds as Extenders in Paints. *Journal of the Oil and Colour Chemists' Association*, v. 35, Jan. 1952, p. 7-19.

Presents results of an investigation of the above, giving detailed information on exposure effects.

3524* Butyl Titanate in Heat Resisting Aluminum Paints. A. Hancock and R. Sidlow. *Journal of the Oil and Colour Chemists' Association*, v. 35, Jan. 1952, p. 28-39.

The physical and chemical properties of butyl titanate are fully described. Properly formulated butyl titanate/aluminium paints, when applied to steel and burned off, leave films of TiO_2 and Al which are very adherent and withstand high temperatures for a long time.

3525 Review of 1951 Developments In Organic Finishing. Arthur L. Phillips. *Organic Finishing*, v. 13, Jan. 1952, p. 8-14.

37 references.

3526 Synthetic Latex Paints in America Today. L. A. Jordan. *Paint Technology*, v. 16, Dec. 1951, p. 521-524.

Surveys the above. Includes notes on styrene; butadiene ratio; and other properties.

3527 Melamine Resins in Surface Coatings. H. F. Henning. *Paint Technology*, v. 16, Dec. 1951, p. 525-531.

Briefly surveys history of the above, their properties, and methods of production. Discusses outdoor finishes, and high and low melamine content resins. Advantages are given.

30. *Paints, Varnishes, Lacquers, and Enamels*

3528 Petroleum Chemicals and Paint. *Paint Manufacture*, v. 22, Jan. 1952, p. 22-25; disc., p. 25. (Based on "Petroleum Chemicals in the Paint Industry" by F. Chapman.)

Briefly discusses the composition of cracking-plant gas and those of the liquid products and their properties as applicable to the paint industry.

3529 Paint Coating Thickness Meters. Part I and II. R. Quarendon. *Paint Manufacture*, v. 21, Oct. 1951, p. 357-362; v. 22, Jan. 1952, p. 5-9, 30.

Reviews types of meter currently available for measurement of the thickness of paint films on various bases. Describes the principles on which these instruments are designed and their fields of usefulness, discusses their advantages and limitations, and deals briefly with problems encountered in this field and progress towards their solution. Part II deals with penetrometers, wet-film thickness gages, electrical-capacity, and radiation-thickness meters.

3530* Development and Research in the Coatings Materials Industry. Howard C. Woodruff. *Paint and Varnish Production*, v. 42, Jan. 1952, p. 33-37, 50.

Discusses the purpose, techniques, and new approaches in research.

3531* What 1951 Did for the Paint Industry. George S. Cook and Howard C. Woodruff. *Paint and Varnish Production*, v. 42, Jan. 1952, p. 18-27.

See also:
2537 (chemical resistance of phenolic and furfuryl-type coatings)
2540 (metal spray as base for paint.)
2686 (preparation and painting steel surfaces)
2755 (antifouling paints)
3418 (coatings and linings for industrial piping)
3471 (alkyd resins in coatings)
3481 (enamels on floor coverings—grease resistance)

31. AGRICULTURAL RESEARCH

3532* Factors Influencing the Efficiency of Fertilizer Conditioners. John O. Hardesty and Rikio Kumagai. *Agricultural Chemicals*, v. 7, Feb. 1952, p. 38, 38A-38D, 39, 115, 117, 119.

Reports results obtained in a study of the effect of conditioners on the caking tendency of mixed fertilizer, as influenced by some of the properties of both the conditioner and the fertilizer mixture. Approximately 1400 laboratory caking tests were carried out on mixed fertilizers, with and without inclusion in the mixture of some 80 different materials commonly used or proposed for use as conditioning agents. (To be continued.)

3533* Agricultural Uses for Maleic Hydrazide. David G. White. *Agricultural Chemicals*, v. 7, Jan. 1952, p. 40-43, 111.

Summarizes progress in above field. Principal use is a growth regulator.

3534* Toxicology and Hazard Record of the Newer Pesticides. Frank Princi. *Agricultural Chemicals*, v. 7, Jan. 1952, p. 44-45, 47, 97, 99, 101, 103.

Evaluates the above as to their toxicity.

3535* Testing Soils for Insecticide Residues. Robert D. Chisholm and Louis Koblitsky. *Agricultural Chemicals*, v. 7, Feb. 1952, p. 47, 49, 119.

The above indicates the degree of hazard to the plant or crop and is essential to compliance with quarantine requirements. Discusses sampling the soil, removing insecticide residue from sample, and analyzing recovered material.

3536* The Fixation of Carbon Dioxide Gas in Light and Darkness by Different Plants. (In Russian.) L. A. Nezgovorova. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 537-540.

$C^{14}O_2$ was used to trace the fixation of C by 8 different plants both with and without light. Data are discussed and tabulated.

3537* The Possibility of Assimilation by Plants of Carbonates Entering With Soil Solutions. (In Russian.) A. L. Kursanov, A. M. Kuzin, and Ia. V. Mamul. *Doklady Akademii Nauk SSSR*, new ser., v. 79, Aug. 1, 1951, p. 685-687.

C^{14} was used to study the assimilation of carbonates by plant roots. Results are discussed and tabulated.

3538* The Influence of Growth Stimulators on Fruit Formation of Tomatoes in Connection With Conditions of Mineral Fertilization. (In Russian.) E. I. Ratner and T. A. Akimochkina. *Doklady Akademii Nauk SSSR*, new ser., v. 79, Aug. 1, 1951, p. 689-692.

The increase of number and weight of fruit by the use of stimulants was investigated. Data are tabulated and charted. Results are illustrated.

3539 A Survey of Plant Protection. J. F. Cronshey. *Chemical Age*, v. 66, Jan. 19, 1952, p. 133-139.

Deals with applications and testing of fungicides. Covers the period from World War I to date. 48 ref.

3540 Chemicals for Fungus Control. S. S. Block. *Chemical Week*, v. 70, Jan. 26, 1952, p. 21-22, 25-26, 29-31.

Describes the many applications of the above. Discusses chemicals developed to meet the demand for fungicides, the most important of which are metallics, phenolics, and organic derivatives of N and S.

3541* *Farm Chemicals.* Published monthly by Ware Bros. Co., 317 N. Broad St., Philadelphia 7, Pa.

Trade magazine for manufacturers, mixers, and formulators of fertilizers and pesticides.

3542* Radiography Applied to Grain and Seeds. Max Milner, Milford R. Lee, and Robert Katz. *Food Technology*, v. 6, Feb. 1952, p. 44-45.

A radiographic method for detection of internal insect infestation in grain, means of low-energy radiation from a Co-target Be-window X-ray tube, is described. The utility of the technique for inspection of wheat, corn, rice, and beans is illustrated.

3543* Electronic Apparatus for *in Vivo* Assay of Plants. R. P. Martin. *Nucleonics*, v. 10, Jan. 1952, p. 50-53.

Describes and diagrams circuit designed to count up to 4 samples containing radioactive tracers with the use of only one scaler.

3544 A New Class of Organic Fungicides. A. R. Kittleson. *Science*, v. 115, Jan. 25, 1952, p. 84-86.

A series of new compounds were synthesized by the reaction of perchloromethyl mercaptan with the alkali metal salts of imides and amides. The purified products obtained from these reactions are, in nearly all cases, colorless, crystalline, odorless compounds and are readily obtained in yields ranging from 80 to 95%. They were found to possess exceptional fungicidal activity.

3544a* Investigation of the Insecticidal Properties of Organic Compounds. Part Three. Action of Single-Ring Aromatic Compounds. (In German.) Vinzenz Prey, Ferdinand Bernan, and Helene Böhm. *Mitteilungen des Chemischen Forschungstitutes der Industrie Österreichs*, v. 5, Dec. 1951, p. 110-116.

Data on 120 of above compounds are tabulated and discussed.

3545* Aircraft in Agriculture. P. H. Southwell. *Journal of the Royal Aeronautical Society*, v. 56, Jan. 1952, p. 33-46.

Surveys applications of the above.

3546 Selection for DDT Resistance in a Beneficial Insect Parasite. D. P. Pielou and R. F. Glasser. *Science*, v. 115, Feb. 1, 1952, p. 117-118.

Describes experiments to see whether it is possible to produce, by selective breeding, appreciable DDT resistance in insect parasites of pest insects.

3547 Tetrahydropyrimidine Derivatives as Potential Foliage Fungicides. Wm. E. Rader, C. M. Monroe, and R. R. Whetstone. *Science*, v. 115, Feb. 1, 1952, p. 124-125.

Summarizes results of an investigation on the above. Data are tabulated.

3548* Plant Studies With Radioactive Calcium. David Ririe and Stephen J. Toth. *Soil Science*, v. 73, Jan. 1952, p. 1-10.

The above study deals with the relative availability to plants of Ca in the carbonate, phosphate, and sulfate forms, as applied so soil for correction of acidity and for fertilizing purposes. It also has to do with the translocation and distribution of Ca in various plants without reference to its source.

3549* Influence of Soil Acidity on Absorption of Calcium by Alfalfa as Revealed by Radiocalcium. W. R. Schmehl, Michael Peech, and Richard Bradfield. *Soil Science*, v. 73, Jan. 1952, p. 11-21.

Greenhouse experiments were conducted to study the above. Radiocalcium was used to label the $CaCO_3$ applied to the soil and the Ca supplied in nutrient solutions. 14 ref.

3550* Effect of Particle Size of Limestones on Soil Reaction, Exchangeable Cations, and Plant Growth. T. A. Meyer and Garth W. Volk. *Soil Science*, v. 73, Jan. 1952, p. 37-52.

Considers in detail the influence of particle sizes, rate of application, and time after application of liming materials upon reaction (pH) and exchangeable-cation changes in the soil and the effect of these changes on growth and chemical composition of alfalfa and soybeans. 21 ref.

Books

3551 Soil Survey Manual. 503 pages. Aug. 1951. U. S. Dept. of Agriculture, Washington. (For sale by U. S. Govt. Printing Office.) (SB591 Un3s)

The above is intended for use by soil scientists engaged in soil classification and mapping. Attention is directed to problems and methods of making and interpreting soil surveys in the U. S. and territories.

3552 Proceedings of the Seventh International Conference of Agricultural Economists. 372 pages. 1950. Oxford University Press, London. (HD1405 In8p)

Printed from a verbatim record of the papers and discussions presented at above conference, held in Stresa, Italy, Aug. 21-27, 1949. Covers the present state of agriculture in all nations. Numerous contributors.

3553 Principles of Weed Control. Gilbert H. Ahlgren, Glenn C. Klingman, and Dale E .Wolf. 368 pages. 1951. John Wiley & Sons, Inc., New York. (SB611 Ah48p)

Discusses the character of weeds, their identification, dissemination, habits, and methods of eradication. Numerous illustrations. Chapter references.

3554 Rykovodstvo Dlia Polevykh i Laboratornykh Issledovanii Pochv. Tom IV. Covremennye Metody Issledovaniia Fiziko-Khimicheskikh Cvoistv Pocho. (Handbook for Field and Laboratory Investigations of Soils. Vol. IV. Contemporary Methods of Investigating the Physico-Chemical Properties of Soils). Nos. 1-2. I. N. Antipov-Karataev, editor. 162 and 251 pages. 1945 and 1947. Moscow and Leningrad, U.S.S.R. (S593 An87s)

First volume (no. 1) contains 3 separate articles on methods for study of soils. Second volume (no. 2) likewise contains 7 articles on specific soil-analysis and investigation methods. Graphs, tables, diagrams, and illustrations.

3555 The Nature and Prevention of the Cereal Rusts as Exemplified in the Leaf Rust of Wheat. K. Starr Chester. 269 pages. 1946. Chronica Botanica Co., Waltham, Mass. (SB608.W5 C42n)

Recounts progress made in the above. Serves as an aid to future efforts at solution of the rust problem. 19-page bibliography.

3556 Fundamentals of Soil Science. Ed. 2. C. E. Millar and L. M. Turk. 510 pages. 1951. John Wiley & Sons, New York. (S591 M61f2)

General principles of soil science are emphasized and explained in simple terms, technical discussions, particularly of debatable points, being omitted. Special attention is given to progress which has been made in fundamental principles since publication of the first edition. One chapter is devoted to soil conservation, and another to the soil resources of the U. S. Proven soil-management practices are referred to, but the details of practices are omitted to a large extent. Numerous maps, graphs and illustrations. Includes a glossary.

3557 Insect Resistance in Crop Plants. Reginald H. Painter. 520 pages. 1951. MacMillan Co., New York. (SB608.F33 P16i)

Brings together the references on work of the above nature and summarizes that work in certain crops as an indication of what has and can be accomplished by this means of insect control. 67-page bibliography.

32. PHYSICS

3558* The Spiral Motion of Metallic Powders 10^{-3} to 10^{-5} Cm. in Diameter in a Magnetic Field. (In German.) Erwin Votava. *Acta Physica Austriaca*, v. 5, Dec. 1951, p. 177-184.

Experiments show that above depends on the intensity of light and the strength of the magnetic field. Includes diagrams and photographs. 20 ref.

3559* The Density of Degenerate Gases in Potential Fields. (In German.) H. Robl. *Acta Physica Austriaca*, v. 5, Dec. 1951, p. 202-213.

Describes two simple methods of formulating equations that can be used to compute the above when the velocity distribution of the particles in a nonmagnetic field is known. The equations are applied to degenerate gases which obey the statistics of Bose-Einstein or of Fermi-Dirac. Data are graphed.

3560* A New Approach to Thin Aerofoil Theory. M. J. Lighthill. *Aeronautical Quarterly*, v. 3, pt. 3, Nov. 1951, p. 193-210.

The general technique for rendering approximate solutions to physical problems uniformly valid is applied to the simplest form of the problem of correcting the theory of thin wings near a rounded leading edge. The flow investigated is two-dimensional, irrotational, and incompressible. The method shows promise of extension to 3-dimensional and compressible flow problems.

3561* Colour in the Wind-Tunnel. D. W. Holder and R. J. North. *Aeroplane*, v. 82, Jan. 4, 1952, p. 16-19.

Tells how changes of air density which occur in the highspeed flow past a body are accompanied by changes of refractive index. As a result, they may be observed, or photographed, by optical methods. The photographs reproduced were taken in wind-tunnels and were selected to illustrate the principles of the methods and the way in which they may be used to visualize important features of the flow. Illustrations and diagrams.

3562* Generalized Conditions of Plasticity. (In Russian.) S. D. Volkov. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 11, 1951, p. 213-216.

The above is considered theoretically under various stress conditions.

3563* Relations Between Average and Maximum Rates During Turbulent Flow in Tubes. (In Russian.) A. D. Al'tshul. *Doklady Akademii Nauk SSSR*, new ser., v. 79, July 21, 1951, p. 405-406.

A brief theoretical development of the above was made. Results are charted.

3564 The Theory of Sound Absorptive Materials. Cyril M. Harris and Charles T. Molloy. *Journal of the Acoustical Society of America*, v. 24, Jan. 1952, p. 1-7.

Reviews of present status of the above. The basic concept of absorption coefficient, as well as the relation between absorption coefficient and acoustical impedance are discussed. Other topics considered are, sound propagation in homogeneous isotropic media, perforated panels, suspended absorbers, and resonant absorbers. 29 ref.

3565 Some Factors Influencing the Dielectric Properties of Barium Titanates. W. R. Eubank, F. T. Rogers, Jr., L. E. Schilberg, and Sol Skolnik. *Journal of the American Ceramic Society*, v. 35, Jan. 1, 1952, p. 16-22.

Capacity-vs.-temperature plots were determined for 2 series of $BaTiO_3$ ceramics prepared from reagent-grade and spectrographic-grade chemicals fired at various temperatures from

32. *Physics*

1100 to 1500°C. Dielectric constants in the spectrographic-grade series were found to be as high as 12,000 and were, in general, 2-3 times as great as those in the reagent-grade series. Also change of capacity (and dielectric constant) with temperature was larger for the purer titanates. Variations in firing temperature were observed to impart different properties to titanates of both series. 20 ref.

3566* Measurement of the Electrical Conductivity of CdS Crystals Irradiated by Elections of Average Energy. (In German.) H. Benda. *Annalen der Physik*, ser. 6, v. 9, Nov. 15, 1951, p. 413-422.

In above study, voltage of the electron stream ranged from 800-3000 V. and current strength from 0.001 to 10 μA. As in photo-irradiation, conductivity varies exponentially with intensity of irradiation. Effect of voltage on conductivity was found to be complex and probably affected by electrode distance. Includes diagrams, graphs, and tables. 14 ref.

3567* On the Problem of Focusing Diffracted X-Rays on an Oblique Flat Film. F. Buckens, *British Journal of Applied Physics*, v. 3, Jan. 1952, p. 7-10.

A geometrical treatment of focusing in the X-ray back-reflection method is given. The form of the irradiated surface, the breadth of the emitting source, and the size and location of the limiting diaphragm are considered. A theory of "secondary focusing" is suggested, with experimental support. The idea can be used for focusing on both sides of an oblique flat film.

3568* Numerical Ray-Tracing in Electron Lenses. J. C. Burfoot. *British Journal of Applied Physics*, v. 3, Jan. 1952, p. 22-24.

A new method for the step-by-step integration of the ray equations was developed. A worked example is given for a strong electrostatic lens. 19 ref.

3569 The Effect of Pulsations on Heat Transfer; Turbulent Flow of Water Inside Tubes. Frank B. West and Allan T. Taylor. *Chemical Engineering Progress* (Engineering Section), v. 48, Jan. 1952, p. 39-43.

Presents a study on the above. Water film coefficients of heat transfer inside tubes for heating and cooling at Reynolds numbers of 30,000-85,000 were increased as much as 60-70% by use of partially dampened pulsating flow from a reciprocating pump. There appears to be an optimum degree of dampening since severe pulsations were not as efficient and resulted in more vibration than moderate pulsations. Data are tabulated. 13 ref.

3570* Theory of Holes in Liquids. Calculation of the Variation of Volume During Melting. (In French.) Genevieve Sutra. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Nov. 12, 1951, p. 1186-1187.

Presents a method of calculating the variation of volume during melting comparing this variation with the total volume of the holes. Data for volumetric and energy factors of Ag, Al, Zn, Na, Ga, Hg, Ne, and A are tabulated.

3571* Variations as a Function of Temperature and of Applied Potential of the Electrical Resistance of Very Thin Metallic Deposits on Diamond, Amber, and Plexiglas. (In French.) Nicolas Mostovetch and Thérése Duhautois. *Comptes Rendus hebdomadaires des Séances de l'Academie des Sciences*, v. 233, Nov. 19, 1951, p. 1265-1267.

Presents results relative to the electrical behavior of very thin metallic films vapor-deposited on above materials, which are polished and which contain electrodes produced by previous deposition of Pt and Ag. Such films have semi-conducting properties independent of the nature of the base.

3572* A Potential Model Making It Possible to Study the Three-Electrode Lens. (In French.) Michel Bernard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Dec. 3, 1951, p. 1438-1440.

Presents a series of formulas describing the above.

3573* Experimental Research on the "Wetting Effect" and "Liquostriction." C. Benedicks and R. Harden. *Engineers' Digest*, v. 12, Dec. 1951, p. 408-412. (Translated and condensed from *Metallurgia Italiana*, v. 43, Sept. 1951, p. 383-397.) Previously abstracted from original.

3574* Turbulent Heat Transfer in a Centrifugal Field. (In German.) F. Schultz-Grunow. *Forschung auf dem Gebiete des Ingenieurwesens*, sec. B, v. 17, no. 3, 1951, p. 65-76.

The heating and cooling effect of a stream of compressed air entering a tube at a tangent in such a manner that one end of the tube emits hot air while the other end emits cold air was theoretically investigated. The temperature has been raised to as high as 160°C. and lowered to −40°C. Includes diagrams and graphs, 13 ref.

3575 Resistance of Plates With Small Electrodes. Charles S. McCleskey, Jr. *Journal of the Franklin Institute*, v. 253, Jan. 1952, p. 59-65.

Formulas for the above are given for the case of two hemispherical electrodes on one face of an infinite plate with correction terms for small edge effects. Results were applied to the metal-thickness meter and confirmed by experiment.

3576* Formal Relationship Between Atomic Theory of Sound Propagation in Liquids and Problems of Electrotechnique, Especially the Quadripolar Theory. (In German.) Kurt Altenburg. *Frequenz*, v. 5, Oct. 1951, p. 285-289.

Theoretical discussion deals with the electrical equivalent-circuit diagram, propagation of sound in pure liquids and mixtures, acoustic stiffness, and nonharmonic vibrations of molecules. 13 ref.

3577* Ferrite Oscillators. (In German.) K. Sixtus. *Frequenz*, v. 5, Nov.-Dec. 1951, p. 335-339.

Discusses magnetostriction oscillators; measuring the complex resistance on an annular ferrite core; the equivalent circuit diagram; effect of premagnetization, excitation, and temperature on resonance frequency and quality; physical interrelations; and possible uses of above. Graphs, diagrams, and references.

3578* Dielectric Properties of Solid and Liquid Alcohols. 1. n-Heptanol. (In French.) Caroline Oppenheim. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Sept.-Oct. 1951, p. 377-380.

Presents results of experimental study of the above in the solid and liquid states between −40 and +50°C. in the frequency range between 80 C/s and 40 Mc/s. The critical frequency dispersion and its variation with temperature were determined. Includes tables and charts.

3579* Recent Investigation Temperature Recovery and Heat Transmission on Cones and Cylinders in Axial Flow in the N.O.L. Aeroballistics Wind Tunnel. G. R. Eber. *Journal of the Aeronautical Sciences*, v. 19, Jan. 1952, p. 1-14.

Research aerodynamic heating effects at supersonic velocities is outlined briefly. Results of recent investigations on temperature recovery and heat transmission along the surface of cones and cylindrical bodies in axial flow are presented. Experiments were conducted at Mach Numbers 1.5-5.0. Results for laminar and turbulent boundary layers are compared. Qualitative effect of direction of heat flow and surface temperature on limits of the transition region is discussed in detail. 11 ref.

3580* Simplified Treatment of the Turbulent Boundary Layer Along a Cylinder in Compressible Flow. Hans U. Eckert. *Journal of the Aeronautical Sciences*, v. 19, Jan. 1952, p. 23-28.

An attempt was made to determine the effect of lateral surface curvature upon the turbulent boundary layer of a circular cylinder immersed in a compressible fluid with its axis parallel to the direction of flow. 12 ref.

3581* Velocity and Temperature Distribution Through the Laminar Boundary Layer in Supersonic Flow. Carlo Ferrari. *Journal of the Aeronautical Sciences*, v. 19, Jan. 1952, p. 39-47.

Deals with a new method for determination of the velocity and temperature through the laminar boundary layer in supersonic fluid flow. This method is related to one expounded by von Kármán and Tsien and to the ideas suggested by Feinsilber, but the present treatment may be applied to a compressible gas, and it holds for any kind of pressure variation along the

boundary in the external stream. Involves successive approximations. The degree of approximation however, may be considered as more than adequate for practical purposes.

3582* Computation of the Laminar Boundary Layer With Suction. Friedrich O. Ringleb. *Journal of the Aeronautical Sciences*, v. 19, Jan. 1952, p. 48-54.

Presents results of work on the above. The method is well suited for theoretical and practical use, combining high accuracy with simplicity. 11 ref.

3583* Turbulent Boundary Layer on a Cone in a Supersonic Flow at Zero Angle of Attack. E .R. Van Driest. *Journal of the Aeronautical Sciences*, v. 19, Jan. 1952, p. 55-57.

Offers a simple transformation rule for fully turbulent boundary layers on cones, similar to that for laminar layers. It was found that, for turbulent boundary layers, the cone solution for local heat transfer is the flat-plate solution for ½ the Reynolds Number on the cone, the Mach Number and wall-to-free-stream temperature ratio remaining the same.

3584* On Supersonic Flow of a Two-Dimensional Jet in Uniform Stream. S. I. Pai. *Journal of the Aeronautical Sciences*, v. 19, Jan. 1952, p. 61-65.

A supersonic gas jet issuing from a reservoir into a medium at rest has a periodic structure if the difference of pressure of the jet from the medium is not large. A similar situation when a supersonic gas jet is issuing into a uniform stream was investigated.

3585 Ultrasonic Propagation in Liquids Under High Pressures; Velocity Measurements on Water. Gerald Holton. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1407-1413.

Describes apparatus used in the above. The specific problems for which the ultrasonic method was used are: measurement of sound velocity as a function of temperature and pressure in liquid samples; use of such data to compute such thermodynamic coefficients as ratio of the specific heats; measurement of sound-attenuation constants, and interpretation of these data in terms of theories of the structure of liquids. 24 ref.

3586 The Propagation in a Compressible Fluid of Finite Oblique Disturbances With Energy Exchange and Change of State. Frederick W. Ross. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1414-1421.

Theory is presented for oblique shock waves involving heat-exchange transfer of part of the compressible fluid to an incompressible state, and change in specific heat ratios.

3587 Free Convection Heat Transfer From Electrically Heated Wires. Erich A. Farber. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1437-1438.

The above study covered 3 parts: heat transfer to liquids between their freezing and boiling points; heat transfer to boiling liquids, changing them into vapors; and heat transfer to vapors and gases.

3588 General Theory of Electromagnetic Horns. A. F. Stevenson. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1447-1460.

Presents the above for a perfectly conducting horn of any shape. 16 ref.

3589 Studies in Newtonian Flow. II. The Dependence of the Viscosity of Liquids on Free-Space. Arthur K. Doolittle. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1471-1475.

A method of extrapolating the specific volumes (reciprocal densities) of the n-alkanes to absolute zero is presented which is believed to give reliable values for all molecular weights studied. Data are tabulated. 14 ref.

3590 Convection Currents in Porous Media. IV. Remarks on the Theory. F. T. Rogers and L. E. Schilberg. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1476-1479.

Differential equations for critical stability of a fluid in a porous medium and heated from below were solved by an approximate method not hitherto used. A single formula was obtained for the thermal environment at critical stability, apparently valid over a wide range of conditions, which allows for temperature dependence of viscosity and nonlinear temperature distributions. New experiments are reported in which initial convection was detected by visual, thermal, and radioactive-tracer methods.

3591 A Problem in Heat Conduction. William Squire. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1508-1509.

A mathematical treatment.

3592 A New Point of View on Magnetic Losses in Anisotropic Bars of Ferrite at Ultra-High Frequencies. H. G. Beljers, W. J. van de Lindt, and J. J. West. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1506.

Describes the circumstances in which an appreciable decrease in the losses is found. A possible explanation is suggested.

3593 Heat Generation by Electric Sparks and Rate of Heat Loss to the Spark Electrodes. Walter Roth, P. G. Guest, Guenther Von Elbe, and Bernard Lewis. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1530-1535.

Describes an investigation on the above. In order to measure the small and rapidly disappearing amount of heat that is generated by a spark, the electrodes were mounted in a small vessel containing a monatomic gas such as argon, and a record was taken either of pressure change at constant volume or of volume change at constant pressure. From such record, the spark-generated heat in the gas at any instant was determined.

3594 Ultrasonic Propagation in Binary Liquid Systems Near Their Critical Solution Temperature. A. G. Chynoweth and W. G. Schneider. *Journal of Chemical Physics*, v. 19, Dec. 1951, p. 1566-1569.

The above investigation was made on aniline and n-hexane and triethylamine and water. Results are given for the variation of the velocity with temperature. The behavior of the sound attenuation through the critical point is also shown. In both systems, the attenuation exhibited a marked maximum at the critical solution temperature.

3595 Interaction of Travelling Magnetic Fields With Ionized Gases. *Nature*, v. 169, Jan. 5, 1952, p. 34-35.

Results of experiments on the above are briefly summarized and discussed.

3596* Canadian Facilities for Isotope Production and Bombardment. F. W. Gilbert. *Nucleonics*, v. 10, Jan. 1952, p. 6-8.

Discusses limitations and capabilities of the reactor having the world's highest neutron flux.

3597* Secondary Electron Emission and Effective Atomic Numbers. Gerald J. Hine. *Nucleonics*, v. 10, Jan. 1952, p. 9-15.

Tells how effective atomic numbers of composite materials can be found from studies of secondary electron emission. 18 ref.

3598* Radiation Chemistry and Sterilization of Biological Materials by Ionizing Radiations. John P. O'Meara. *Nucleonics*, v. 10, Feb. 1952, p. 19-23.

The problem of dealing with undesirable chemical effects produced in foodstuffs, pharmaceuticals, and biologicals sterilized by ionizing radiations is part of the greater problem of determining the usefulness of fission products for sterilization on a commercial scale. The nature of these effects and the conditions under which they occur are discussed. 39 ref.

3599* Nomogram for Calculatng Fission-Product Aetivities. L. G. Stang, Jr. and Paul D. Hance, III. *Nucleonics*, v. 10, Jan. 1952, p. 48-49.

Presents above. Includes mathematical derivation and explanation of use.

3600 Some Aspects of the Development of Sheet Polarizers. Edwin H. Land. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 957-963.

Reviews the 25 years of activity, in the development of synthetic sheet polarizers. The early work during the 19th century is described briefly, and various stages of modern development are chronicled. Nature of optical properties of currently-available Polaroid sheet polarizers and quantitative methods used in characterizing them, are described. Reasons are given for developing special polarizers for each of a variety of applications such as optical instruments, vectographs, and headlights.

3601 On the Measurement of "Daylight Fluorescent" Materials. John E. Tyler and Francis P. Callahan, Jr. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 997-1001.

A method is described for analyzing the light remitted from

32. *Physics*

certain daylight fluorescent colors into its reflected and fluoresced components. The evaluation in both cases is on an energy basis as a function of wavelength of the exciting radiation with energy content of the exciting beam held constant.

3602* The Magnetization Process in Ferrites. (In English.) H. P. J. Wijn and J. J. Went. *Physica*, v. 17, Nov.-Dec. 1951, p. 976-992.

The initial magnetization curve of ferrites was measured as a function of frequency up to 2 Mc./s. It was found that the magnetization of sintered ceramic ferrites with a high permeability is brought about by at least two processes, one of which, in the frequency range covered, is independent of frequency and determines the initial permeability. The other process has a relaxation frequency of about 200 kc./s. and is responsible for the irreversible processes during magnetization. Data are graphed. 14 ref.

3603* Free Electrons, Traps and Glow in Crystal Phosphors. (In English.) M. E. Wise. *Physica*, v. 17, Nov.-Dec. 1951, p. 1011-1032.

The well known monomolecular and bimolecular theories of afterglow and thermal glow are summarized. Observed results on phosphors of ZnS type are discussed, particularly for phosphors with long afterglow in which the intensity-time laws are hyperbolic. Includes a new and simple law that describes the observations mathematically. Also a new physical theory for free and trapped electrons is outlined, and this is discussed in relation to F and F′ centers in alkali halides and to an unsolved problem of semiconductor theory. 23 ref.

3604* Curie Temperature of Nickel-Zinc Ferrites as a Function of the Nickel-Zinc Ratio. (In English.) K. F. Niessen. *Physica*, v. 17, Nov.-Dec. 1951, p. 1033-1049.

Presents a mathematical calculation of the above. 12 ref.

3605 A Note on the Adiabatic Thermomagnetic Effects. Herbert B. Callen. *Physical Review*, ser. 2, v. 85, Jan. 1, 1952, p. 16-19.

The thermodynamic theory of transverse adiabatic thermomagnetic effects is extended, and the final complete set of thermodynamic relations among all thermomagnetic effects is summarized.

3606 Experimentally Derived Configurational Coordinate Curves for Phosphors. Clifford C. Klick. *Physical Review*, ser. 2, v. 85, Jan. 1, 1952, p. 154-155.

Describes a technique for determination of the above.

3607 On the Relations Between the Photo-Elastic Properties and the Raman Effect in Crystals. O. Theimer. *Proceedings of the Physical Society*, v. 65, sec. A, Jan. 1952, p. 38-45.

A mathematical treatment.

3608 Classical Theory of Compressibility. P. J. Price. *Proceedings of the Physical Society*, v. 65, sec. A, Jan. 1952, p. 54-55.

By extending Green's treatment of the classical virial theorem, a formula for the bulk modulus of an assembly of atoms, when classical physics applies, is derived. This formula involves the binary and ternary distribution functions.

3609 A New Determination of the Luminance Factor of Magnesium Oxide. J. S. Preston and G. W. Gordon-Smith. *Proceedings of the Physical Society*, v. 65, sec. B, Jan. 1, 1952, p. 76-80.

A simple, direct, and absolute method of reflectometry is described, avoiding the use of the inverse square law, and overcoming several of the drawbacks of the selenium photovoltaic cell which is used for the measurements. Results are presented and discussed.

3610 A Transitron Nuclear Magnetic Resonance Detector. H. W. Knoebel and E. L. Hahn. *Review of Scientific Instruments*, v. 22, Dec. 1951, p. 904-911.

A simple circuit for obtaining nuclear magnetic resonance absorption signals was developed. Conventional modulation of the magnetic field is replaced by frequency modulation of the oscillator. Principles of operation and construction techniques are described.

3611 Low-Temperature Physics. G. O. Jones. *Science Progress*, v. 40, Jan. 1952, p. 23-43.

Presents survey of the above in relatively simple terms. Discusses problems to be solved. 20 ref.

3612 Physics. F. A. Vick. *Science Progress*, v. 40, Jan. 1952, p. 84-89.

Reviews recent developments in secondary-electron emission.

3613* Heat Transmitting Mirror. G. L. Dimmick and M. E. Widdop. *Journal of the Society of Motion Picture and Television Engineers*, v. 58, Jan. 1952, p. 36-41; disc., p. 41-42.

Radiant energy incident upon a glass plate can be divided into transmitted and reflected bands by the interference effect in thin films of dielectrics deposited on the glass. The mirror described reflects over 95% of incident visible light and transmits a large part of the energy beyond 7000°A. Typical transmission characteristics and several arrangements for use of such a mirror with a carbon arc are shown.

3614 Servo System Comparators. Martin Cooperstein. *Sylvania Technologist*, v. 5, Jan. 1952, p. 21-24.

Describes phase detection in the servo motor, electrically gated phase detection, and pulse coincidence comparison. Each is considered for angular resolution and stability of balance in an experimental servo loop, and a relative evaluation is made among them.

3615* Radiant Heat Exchange of Flying Bodies. (In German.) Werner Spillman. *Zeitschrift für angewandte Mathematik und Physik*, v. 2, Nov. 15, 1951, p. 470-484.

In order to determine the amount of radiation in the heat transfer of flying bodies, absorption of the atmospheric layers is calculated by making use of known solar radiation. The resulting approximation is applied to practical problems, especially for pressurized cabins of fighter aircraft.

3616* Semimetals With Continuous Transition of Properties Between Metallic and Ceramic State. (In German.) Eberhard Meyer-Hartwig. *Zeitschrift für Metallkunde*, v. 42, Oct. 1951, p. 302-308.

Describes new method by which the production of semi-conductors with transition properties from mixtures of ceramic and metal powders was accomplished. Resistance values between those of metals and ceramics are tabulated; high and low-temperature conductors made of the new material are investigated. Diagrams and micrographs.

3617* Measuring Hall Effect of Zinc Oxide. (In German.) K. Intemann and F. Stockmann. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 10-16.

Describes determination of the above on vapor-deposited ZnO films, results being in satisfactory agreement with those for a compact mass of ZnO. A diagram, graphs, and tables. 14 ref.

3618* Temperature Measurements on Water-Stabilized High-Amperage Arcs. (In German.) F. Burhorn, H. Maecker, and T. Peters. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 28-40.

Spectroscopic temperature measurements on above arcs of 2.3 mm. diam., from 100 to 1500 amp., using the method of R. W. Larenz, gave values up to 50,000°K. These and other methods, as well as theoretical considerations, make it possible to show the isothermal regions in characteristic diagrams for all water-stabilized high-capacity arcs.

3619* Theory of Dynamic Deformation. (In German.) F. Vitovec and H. Nowotny. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 41-47.

Shows that the dependence of critical shear stresses on rate of deformation as computed by R. Becker's dynamic plasticity equation contradicts most test results. A new equation for determining above, yields results which agree satisfactorily with most test results. Data are graphed. 17 ref.

3620* Statistical Theory of Non-Homogeneous Turbulance. Part 2. (In German.) J. Rotta. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 51-77.

Presents a mathematical study of the effects that determine time and spatial changes of linear dimensions which describe the characteristics of turbulence. Graphs. 16 ref.

3621* Reciprocal Action of Surface Layer and Statistical Fluctuations in a Three-Electrode Crystal. (In German.) H. F. Mataré. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 82-97.

Causes of semiconductor noise were investigated. Shows that the interaction of noise sources greatly increases statistical fluctuations in the resulting resistances, pointing to the conclusion that interstellar emission centers are based on analogous noise sources. Data are charted and tabulated. 31 ref.

3622* Dipolar and Quadrupolar Fields of Radiation in Non-Cubic Crystals. (In German.) K. H. Hellwege. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 98-112.

Mathematics of above includes discussion of experiments on separation of electric and magnetic dipolar radiation and electric quadrupolar radiation, and of a probable case of quadrupolar radiation. Includes diagrams and tables. 12 ref.

3623* Displacement Structures in Cubic-Phase Centered Crystals. I. (In German.) Günther Leibfried and Horst-Dietrich Dietze. *Zeitschrift für Physik*, v. 131, Dec. 1, 1951, p. 113-129.

Explanation and expansion of Peierl's theorem includes discussion of different types of displacement in the (010) and (111) planes of above crystals. Diagrams and graphs. 10 ref.

Miscellaneous Publications

3624 Values for the Eddy Diffusion Coefficient. W. Karush. U. S. Atomic Energy Commission, AECD-3256, June 8, 1945, 9 pages. (UF767 Un3m)

A mathematical treatment.

3625 Uranium Gamma Spectrum. P. R. Bell, R. C. Davis, J. E. Francis, and Judith M. Cassidy. U. S. Atomic Energy Commission, AECD-3224, July 20, 1951, 9 pages. (UF767 Un3m)

The natural gamma radiations from a number of uranium isotopes were studied by means of a scintillation spectrometer. Data are tabulated and graphed.

3626 General Consideration of Problems in Compressible Flow Using the Hodograph Method. Chieh-Chien Chang. National Advisory Committee for Aeronautics, Technical Note 2582, Jan. 1952, 113 pages. (TL570 Un3t)

A mathematical treatment. Numerous charts. 77 ref.

3627 Investigation of Laminar Boundary Layer in Compressible Fluids Using the Crocco Method. E. R. Van Driest. National Advisory Committee for Aeronautics, Technical Note 2597, Jan. 1952, 78 pages. (TL570 Un3t)

A mathematical treatment. Includes numerous charts.

3628 A General Theory of Three-Dimensional Flow in Subsonic and Supersonic Turbomachines in Axial-, Radial-, and Mixed-Flow Types. Chung-Hua Wu. National Advisory Committee for Aeronautics, Technical Note 2604, Jan. 1952, 93 pages. (TL570 Un3t)

In the above, a solution of the 3-dimensional direct and inverse problem was obtained by investigating an appropriate combination of flows on relative stream surfaces whose intersections with a z-plane either upstream of or somewhere inside the blade row form a circular arc or a radial line. 47 ref.

3629 Spectrum of Turbulence in a Contracting Stream. H. S. Ribner and M. Tucker. National Advisory Committee for Aeronautics, Technical Note 2605, Jan. 1952. 54 pages. (TL570 Un3t)

The spectrum concept was employed to study the selective effect of stream contraction on longitudinal and lateral turbulent velocity fluctuations of the stream. 12 ref.

3630 One-Dimensional Compressible Flow in Vaneless Diffusers of Radial- and Mixed-Flow Centrifugal Compressors, Including Effects of Friction, Heat Transfer and Area Change. John D. Stanitz. National Advisory Committee for Aeronautics, Technical Note 2610, Jan. 1952, 61 pages. (TL570 Un3t)

An analysis method and a design method were developed for the above. 3 groups of numerical examples are presented in which effects of friction, heat transfer, and diffuser wall spacing were investigated.

Books

3631 Achievements in Optics. A. Bouwers. 135 pages. 1950. Elsevier Publishing Co., New York. (QC357 B66a)

Gives a survey of work on optics in the Netherlands during the last war or immediately before. An attempt was made to arrange the subjects in such a way that continuity of thought is maintained wherever possible. New optical systems, new optical instruments, geometrical optics, and physical optics are the principal subdivisions.

3632 Some Aspects of Fluid Flow 292 pages. 1951. Edward Arnold & Co., London. (TA5 In7s)

Presents 15 papers given at a conference of the Institute of Physics at Leamington Spa., England, Oct. 25-28, 1950. Contains the following: "Survey of Industrial Problems Involving Turbulent Mixing of Fluids," M. P. Newby and M. W. Thring; "Survey of Industrial Problems Involving the Combined Flow of Fluids and Solids," R. L. Brown; "Survey of Industrial Problems Involving the Pattern of Fluid Flow," W. A. Simmonds; "Survey of Industrial Problems Involving the Hydromechanics of Fluid Flow," L. E. Prosser and R. C. Worster; "Problems in the Atomisation of Liquids," H. L. Green; "Boundary Layers and Skin Friction in a Compressible Fluid Flowing at High Speeds," A. D. Young; "The Effect of Concentration on the Settling of Suspensions and Flow Through Porous Media," P. G. Hawkesley; "Fluid Flow Through Beds of Granular Materials," H. E. Rose; "Some Aspects of Fluid Flow in Orifices, Nozzles and Venturi Tubes," H. E. Dall; "Techniques for the Study of Fluid Flow," J. H. Chesters, I. M. O. Halliday, and R. S. Howes; "Fluid Flow in Relation to the Manufacture of Steel," M. P. Newby; "A New Aerodynamic Technique Employing Radon for Tracing Gas Flow in Hot Systems," R. Mayorcas and K. P. Perry; "Theory and Design of Simple Ejectors," R. A. Smith; "The Laws of Motion of Particles in Fluids and Their Application to the Resistance of Beds of Solids to the Passage of Fluid," R. A. Mott; and "Turbulence Excitation on Ship Models," J. F. C. Conn.

3633 Electrophoresis in Physiology. Lena A. Lewis. 66 pages. 1950. Charles C. Thomas, Springfield, Ill. (QP341 L58e)

Outlines basic physical principles and methods for the above. Applications are discussed. 107 ref.

3634 Dielectric Breakdown of Solids. S. Whitehead. 271 pages. 1951. Clarendon Press, Oxford, England. (QC585 W58d)

Presents a study of the electric strength of dielectrics. Although theories are given in detail, mathematical demonstrations are preceded by qualitative accounts and experimental results; and conclusions are summarized at intervals.

See also:

2640 (semiconducting properties of Pb Te and Pb Se)
2659 (ferromagnetism)
2877 (food-irradiation procedures)
2878 (temperature gradients in turbulent gas flow)
2884 (furnace run by atomic energy)
2918 (thermal conductivity of optical crystals)
2951 (measurements of skin friction in subsonic and supersonic flow)
3078 (high-altitude flight problems)
3146 (turbulent flow of fuels in nozzles)
3197 (reviews on fluid dynamics and heat transfer)
3365 (physical properties of solids)
3414 (ultrasonic effects on mechanical properties)
3697 (progress in physics at M.I.T.)
3751 (nuclear power for industry)
3757 (engineering in nuclear-energy development)

33. ELECTRICITY AND ELECTRONICS

3635 Frequency-Band Multiplication or Division and Time-Expansion or Compression by Means of a String Filter. Friedrich Vilbig. *Journal of the Acoustical Society of America*, v. 24, Jan. 1952, p. 33-39.

An exact relationship between the input and output frequencies is shown. Two different methods are described.

3636 The Frequency Response of Barium Titanate Transducers. T. F. Hueter and E. Dozois. *Journal of the Acoustical Society of America*, v. 24, Jan. 1952, p. 85-86.

Describes experiments made to establish the modes of vibration

33. *Electricity and Electronics*

and to determine impedance values necessary for electronic developments in above transducers.

3637 Laboratory Measurement of Iron Losses at Audio Frequencies. C. C. Horstman and A. Lucic. *ASTM Bulletin*, Jan. 1952, p. 64-66.

Describes an instrument for laboratory testing of core material for iron-core inductor components at frequencies higher than 60 cycles. Includes a description of the equipment and lists the operational details of the instrument and special requirements for obtaining accuracy and reliability in these higher frequency measurements.

3638* Compilation of the Propagation Constants of an Inhomogeneously-Filled Waveguide. Ll. G. Chambers. *British Journal of Applied Physics*, v. 3, Jan. 1952, p. 19-21.

Use is made of the Rayleigh-Ritz method of finding frequencies of vibration of a mechanical system, and for finding the propagation constants of an inhomogeneously-filled waveguide.

3639* *Communication News.* Published quarterly by N. V. Philips, Telecommunicatie Industrie, Hilversum, Holland.

Contains articles dealing with technical problems, processes, and investigations on transmitters, transmitting tubes, line telephony, line telegraphy, and automatic telephony.

3640* Effect of Proximity and the High-Frequency Mutual Induction Coefficient of a Wire and a Part of a Thick Plate, Conducting and Parallel. (In French.) Antoine Colombani. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 233, Nov. 19, 1951, p. 1267-1269.

Presents a brief mathematical study of the above.

3641 Detection of Slot Surface Discharges in High-Voltage Machine Stator Windings. J. S. Johnson. *Electrical Engineering*, v. 71, Feb. 1952, p. 143-147. (To be published in *AIEE Transactions*, v. 70, 1951.)

Basic studies of the nature and method of the above show that the discharge is a result of loss of electric contact between conducting coil surfaces in the slot and the core. Several methods were studied for detecting and locating such discharges. Development of a slot discharge analyzer is described.

3642 Slot Discharge Detection in High-Voltage Generators During Operation. J. S. Johnson and Mead Warren. *Electrical Engineering*, v. 71, Feb. 1952, p. 149-151. (To be published in *AIEE Transactions*, v. 70, 1951.)

Describes the above method which permits tests without shutting down the machine or using auxiliary high-voltage equipment. Tests on 8 large water-wheel generators indicate that the method is generally applicable if there is a current transformer or other impedance in the generator neutral.

3643 High-Power Vacuum Tubes for Industrial Heating. H. D. Doolittle. *Electrical Engineering*, v. 71, Feb. 1952, p. 152. (A condensation. To be published in *AIEE Transactions*, v. 70, 1951.)

Analyzes vacuum-tube failures. Describes a series of improved tubes designed to cover the power range from 5 to 200 kw. output power.

3644 Electron Tube Experience in Computing Equipment. J. A. Goetz and A. W. Brooke. *Electrical Engineering*, v. 71, Feb. 1952, p. 154-157.

The malfunctioning or failure of electron tubes in a computer is a large item in the over-all cost of its operation. Methods of testing and the findings are given.

3645 A Study of Helium Gas Clean-Up in an Electric Arc Discharge. M. J. Reddan and G. F. Rouse. *Electrical Engineering*, v. 71, Feb. 1952, p. 159-164. (To be published in *AIEE Transactions*, v. 70, 1951.)

Discusses, and presents results of the above study in which gas-discharge tubes with movable cylindrical probes were used to determine the clean-up which results from the bombardment of a Ta surface by positive He ions.

3646 The Selenium Rectifier for Contact Protection. H. F. Herbig and J. D. Winters. *Electrical Engineering*, v. 71, Feb. 1952, p. 166. (A condensation. To be published in *AIEE Transactions*, v. 70, 1951.)

Describes a voltage-surge suppressor comprising Se rectifier cells connected in series (in opposed relation) whereby the resulting resistance is high at low voltages and low at high voltages. This combination of rectifiers, when used for electrical-contact protection, results in an excellent arc-suppressing device which does not affect materially the release time of the shunted electromagnet.

3647 The Effect of Unit Size on Steam-Electric Generating Station Design. J. B. McClue and A. G. Mellor. *Electrical Engineering*, v. 71, Feb. 1952, p. 174-179.

Discusses economic factors which effect design of larger generating equipment and stations. Such advantages as lower investment cost per kilowatt, higher efficiency, and lower operating costs are considered.

3648 An Evaluation of Butyl Insulation for Outdoor Instrument Transformers. J. A. McDonnel and H. E. Crabtree. *Electrical Engineering*, v. 71, Feb. 1952, p. 182-186.

Discusses the successful application of molded butyl compound as insulation on a new instrument transformer for indoor and outdoor use on secondary circuits. Investigations concerning the use of this compound for outdoor use are described.

3649* Limit Switches in Industrial Machine Control. I. Mark Morgan. *Electrical Manufacturing*, v. 49, Jan. 1952, p. 84-89.

As a guide to the application engineer, mechanical and electrical characteristics of heavy industrial and miniature limit switches are reviewed. Presents graphical data and illustrations.

3650* Research Progress in Dielectrics. Alex E. Javitz. *Electrical Manufacturing*, v. 49, Jan. 1952, p. 90-96, 230, 232, 234, 236, 238, 240, 242.

An annual review of the above. New materials discussed include mica papers, polyester capacitor film, and fluorocarbons. Recent advances in ceramic and glass dielectrics are also surveyed.

3651* The Deposition of H. F. Crystal Electrodes by Vacuum Coating. L. Holland. *Electronic Engineering*, v. 24, Jan. 1952, p. 10-13.

Shows that the present method of frequency adjusting h.f. crystals by combined cathodic sputtering and electroplating techniques can be largely replaced by the single operation of evaporation coating. Details of apparatus are described, diagrammed, and illustrated. Emphasis is on application of gold and other precious metals onto quartz crystals.

3652* Counting-Rate Meters. G. D. Smith. *Electronic Engineering*, v. 24, Jan. 1952, p. 14-18.

Describes and diagrams various types of the above. Includes performance curves. 17 ref.

3653* The Single-Pulse Dekatron. J. R. Acton. *Electronic Engineering*, v. 24, Feb. 1952, p. 48-51.

Gives details of a new type of gas-filled, cold-cathode counting tube, differing from the dekatrons previously described, in requiring only a single pulse for each complete unit step. The "double-pulse" dekatrons of which the GC10A is the best-known have found wide acceptance in scalers and computors, and it was found possible to retain many of the desirable features of the GC10A in the new tubes.

3654 Electronics Engineering Needed in Medicine. Herman I. Kantor. *Electronics*, v. 25, Feb. 1952, p. 82-83.

Medical progress depends to a great extent on progress in electronic devices that enable the research worker and clinician to measure and control physiological phenomena. Past, present, and future jobs for electronics are discussed.

3655 Inexpensive Square-Wave Generator. G. W. Gray. *Electronics*, v. 25, Feb. 1952, p. 101-103.

Describes a cathode-controlled multivibrator employing 3 tube envelopes which gives square waves from 50 cps. to 1 mc. with only 2% tilt in the negative half. An additional circuit is described in which a pair of pentodes replaces cathode resistors to produce square waves.

3656 R-F Bursts Actuate Gas-Tube Switch. H. J. Geisler. *Electronics*, v. 25, Feb. 1952, p. 104-105.

Describes a technique for using simple gas diodes as r.f. actuated switches in storage, accumulator, and other circuits of electronic computers. Bursts from pulsed r.f. oscillators are applied to bands around diodes. Operating speed up to 100,000 pps. are feasible.

3657 Magnetic Modulators. E. P. Felch, V. E. Legg, and F. G. Merrill. *Electronics*, v. 25, Feb. 1952, p. 113-117.

Tells how the conversion of low-level, low-frequency or d.c. signals to a.c. signals capable of being amplified by conventional means is accomplished by magnetic-amplifier-type device that combines high efficiency and reliability with extreme ruggedness. Diagrams. 11 ref.

3658 Gain-Stabilized Mixer. *Electronics*, v. 25, Feb. 1952, p. 170, 174-175.

Describes a new type of feed-back mixer developed by the NBS. Its outstanding feature is the retention of gain calibration over long periods of time. Diagrams.

3659 Fast Construction of Temporary Circuits. Arthur R. Jubenville. *Electronics*, v. 25, Feb. 1952, p. 178, 182, 186.

The approach to temporary circuitry described makes it possible to mount speedily any series of components in the desired physical and electrical relationship. Illustrated.

3660 Line-Terminated Pulse Stretcher. L. Reiffel and G. M. Burgwald. *Electronics*, v. 25, Feb. 1952, p. 186, 190, 194.

Describes above circuit. Diagram.

3661 Control System for Induction Heaters. *Electronics*, v. 25, Feb. 1952, p. 194, 198, 202. (Condensed from "Induction Heater Control System," R. W. Ketchledge, *Bell System Technical Journal*, Sept. 1951.)

When silver soldering or brazing near rubber or plastic insulation, the operation should be completed as rapidly as possible to avoid damage to the insulation and to the parts being brazed or soldered. The control system described reduces the power when the desired temperature has been reached and disconnects the power when the braze is completed.

3662* Rectifier-Motor Variable-Speed Drives. P. Bingley. *Engineering*, v. 173, Jan. 11, 1952, p. 61-62.

Deals with the construction of rectifiers and shunt-wound motors as a means of providing variable-speed drives for industrial machinery.

3663* The Temperature Limit of Power Cables. N. Klein. *Engineers' Digest*, v. 12, Dec. 1951, p. 399-402.

Attempts to clarify fundamental principles which have to be taken into consideration when determining the maximum working temperatures of cables.

3664* Input Transformer With Spaced Secondary Winding and Simple Stray Resonance. (In German.) Oswald Illner. *Frequenz*, v. 5, Oct. 1951, p. 265-272.

Presents a substitute circuit diagram for above and shows that proposed imput transformer permits transmission of a frequency band about 40% broader than the one transmitted by the customary imput transformer. Includes diagrams and graphs.

3665* Exact Analysis of Linear Rectifying Circuits. (In German.) Heinz Niehrs. *Frequenz*, v. 5, Oct. 1951, p. 273-279.

Based on the assumption of linear rectifier characteristics, a complete and exact computation of above is presented. Includes diagrams, graphs, and tables.

3666* Cubic Distortions at a Ring Modulator. (In German.) L. Christiansen. *Frequenz*, v. 5, Nov.-Dec. 1951, p. 298-303.

Discusses formation of above modulation distortions which result in understandable and nonunderstandable cross talk. Measurements on Ge modulators confirm the theoretical studies. Diagrams and graphs.

3667* The Equivalent Circuit Diagram of the Ferromagnetostrictive Transformer. (In German.) H. Schönfeld. *Frequenz*, v. 5, Nov.-Dec. 1951, p. 331-334.

Derivation of above is limited to small modulations. Discusses the laws of spurious coupling between electrical and magnetic sizes in ferromagnetostrictive transformers. Presents a model of the ferromagnetostrictive bar, and describes procedure of computing above circuit diagram. Diagrams, graphs, and references.

3668* Packaged Electrical Distribution Equipment. A. B. White. *Industry and Power*, v. 62, Feb. 1952, p. 75, 98.

A general survey of modern equipment and circuits and engineering practices commonly in use and accepted in present-day installations. Provides a working background for more detailed future articles concerned with particular phases and their associated problems. Numerous diagrams and illustrations.

3669 Stabilization of Dielectrics Operating Under Direct Current Potential. H. A. Sauer, D. A. McLean, and L. Egerton. *Industrial and Engineering Chemistry*, v. 44, Jan. 1952, p. 135-140.

Consideration of the status of practice and theory of stabilizing dielectrics for use on d.c. potentials indicated the need for a more extensive study under carefully controlled conditions. In this study, all tests were made at 130°C., 450 volts d.c., on 2 layers of impregnated 0.4-mil. capacitor paper. Particular attention was paid to effects of stabilizer concentration and to stabilization of mineral oil capacitors. Findings suggest a much wider use of stabilizers in d.c. capacitors, especially through extension to mineral oil types, and direct renewed attention to the theory of stabilization and to the need for additional fundamental work in this field. 15 ref.

3670* "Trends in E.H.V. Transformer Design." C. C. Rippon. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 1, Jan. 1952, p. 18-19. (A condensation.)

Surveys the above. Points out that progress may be expected in manufacturing techniques which will improve transformer performance.

3671* New Factors in the Design of Electromagnetic Products. G. R. Polgreen. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 1, Jan. 1952, p. 22-23. (A condensation.)

Considers the ideal materials, designs and manufacturing methods for electromagnetic products, and discusses the extent to which these can now be attained as a result of recent developments and discoveries.

3672* The Travelling-Wave Valve as a Microwave Phase-Modulator and Frequency-Shifter. W. J. Bray. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 3, Jan. 1952, p. 15-20.

Discusses the above. Measurements made on a typical tube operating at 4000 Mc./s. are recorded and show that about ±2.5 radians linear phase shift is obtainable with a modulating signal of ± 50 volts injected in series with the beam voltage. Larger phase shifts may be obtained by applying the modulating voltage to a number of tubes in series.

3673* The Relative Power-Carrying Capacity of High-Frequency Waveguides. H. M. Barlow. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 3, Jan. 1952, p. 21-27.

The power-carrying capacity was determined, within limits of electrical breakdown, for various forms of metal waveguide. The discussion relates to wave modes commonly used inside tubes of rectangular and circular cross-section, or alternatively outside a solid wire. Data are graphed.

3674 Instrument Electronics. VI. Gas-Filled Tubes. Milton H. Aronson. *Instruments*, v. 25, Jan. 1952, p. 67-69, 78-79.

Discusses and compares the basic characteristics of ignitrons, thyratrons, and phanotrons.

3675 Single-Knob Adjustment of Reset Rate and Gain. W. I. Caldwell. *Instruments*, v. 25, Feb. 1952, p. 196-200; *I.S.A. Journal*, v. 8, Feb. 1952, p. 10-14.

Describes a new circuit for a proportional plus automatic-reset controller which has one adjustment which changes the proportional gain and reset rate simultaneously, without the use of mechanical linkages. The setting of this adjustment controls the stability of the system.

3676 Instrument Electronics. Milton H. Aronson. *Instruments*, v. 25, Feb. 1952, p. 180-184, 218-219.

Transformers, rectifiers, filters, and typical supplies, regulated and unregulated, are discussed.

33. *Electricity and Electronics*

3677 Electronics in the Steel Industry—Past, Present, and Future. H. W. Poole. *Iron and Steel Engineer*, v. 29, Jan. 1952, p. 62-69.

Discusses present applications and practices in this country and abroad, and some future trends. In the steel industry, electronics have been employed in 4 major fields: power electronics used primarily for power conversion; electronic control; high-frequency electronic heating; and electronic measurements. Deals with each, giving examples, but concentrates on power electronics.

3678 A Critical Study of the Circuit Concept. Jesse Gerald Chaney. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1429-1436.

A mathematical treatment.

3679 A Method of Producing an Electric Current From Radioactivity. P. E. Ohmart. *Journal of Applied Physics*, v. 22, Dec. 1951, p. 1504-1505.

Describes experiments showing that if a cell, made up of two electrochemically dissimilar materials separated by a gas, is connected to a current-measuring device, a small continous current will be caused to flow from the more noble to the more active electrode without an external source of voltage when the separating gas is ionized by exposure to nuclear radiation.

3680* A Note on the Temperature Coefficients of Running Voltage of Glow-Discharge Tubes. F. A. Benson and H. Bache. *Journal of Scientific Instruments*, v. 29, Jan. 1952, p. 25-26.

Temperature coefficients of operating voltage for 14 different types of tube were recorded as the ambient temperature was rduced below room temperature. This work was carried out to determine whether the temperature coefficients are of opposite sign for deviations above and below room temperature. An attempt is made to explain the phenomena observed.

3681 An A.C. Stabilizer. B. Collinge and T. N. Marsham. *Journal of Scientific Instruments*, v. 28, Dec. 1951, p. 374.

A voltage stabilizer is described which provides a continuously variable alternating voltage which is independent of line-frequency variations and free of waveform distortion. Electronic control of a 2 kVA. Variac is used to provide an output voltage constant to within ± ½ v. 22 ref.

3682 Standing Waves in Low-Energy Electron Beams. W. W. H. Clarke and L. Jacob. *Nature*, v. 168, Dec. 29, 1951, p. 1120-1121.

Reports results of an investigation on the above. Emission density, emitting area, and initial electron velocity are altered by changes in temperature.

3683 The Electronic Flip-Flop as a Machine Element. John B. Flynn. *Product Engineering*, v. 23, Feb. 1952, p. 124-129.

The above is discussed and diagrammed. Applications are given.

3684 Modern Control Circuits for Electric Brakes and Clutches. Andrew H. Decker. *Product Engineering*, v. 23, Feb. 1952, p. 138-143.

Discusses mechanism of the above giving advantages. Circuit diagrams and graphical data are presented.

3685* Aglebra in Electronic Design. Edmund C. Berkeley. *Radio-Electronics*, v. 23, Feb. 1952, p. 55-58.

In a previous article, an interpretation of Boolean algebra, as used in the design and simplification of circuits and mechanical brains, was given. Further interpretation is now given in terms of propositions or statements, rectifiers and triodes. Diagrams.

3686* A Method of Improving the Electrical and Mechanical Stability of Point-Contact Transistors. B. N. Slade. *RCA Review*, v. 12, Dec. 1951, p. 651-659.

The use of thermosetting resins for embedding of above transistors has resulted in marked improvement in transistor mechanical and electrical stability. Developmental resin-embedded transistors were subjected to severe impact and centrifuge tests with practically no change in electrical characteristics. Transistors utilizing this construction are highly resistant to the attack of water vapor and are able to withstand extended storage periods at elevated temperatures. Operation at low temperatures is satisfactory, but some changes in electrical characteristics occur at high ambient temperatures.

3687* Fundamental Processes in Charge-Controlled Storage Tubes. B. Kazan and M. Knoll. *RCA Review*, v. 12, Dec. 1951, p. 702-753.

Part 1 is concerned with the equilibrium potentials of insulated elements under electron bombardment and the action of light. In Part 2, definitions are given of important dynamic storage-tube functions. In Part 3, the dynamic processes of writing, reading, and erasing, and also the capabilities of the different writing and reading methods for producing halftones are discussed. Part 4 consists of a relatively complete bibliography on storage tubes and also includes references to the fundamental charging processes for insulating surfaces.

3688* Survey of Radio-Frequency Resistors With Kilowatt Ratings. D. R. Crosby. *RCA Review*, v. 12, Dec. 1951, p. 754-763.

The design and operating characteristics of several types of high-dissipation, radio-frequency resistors are discussed. The study is mainly in the region from 300 kilocycles to 30 megacycles, which includes long-range communication frequencies and high-power industrial heating.

3689* Mechanical Considerations Affecting Vacuum Tube Reliability. Part 1. R. J. E. Whittier. *Tele-Tech*, v. 11, Feb. 1952, p. 42-44, 62.

Tells how tubes manufactured for guided-missile equipment require special attention to heat dissipation, vibration effects on mechanical fatigue, microphonism, and noise factors. Discusses avoidance of "tube-critical" circuits.

3690* Contribution to the Study of Electron Tubes With the Aid of Radioactive Elements. (In French.) Jean Debiesse and Georges Neyret. *Vide*, v. 6, Nov. 1951, p. 1098-1102.

Radioactive barium was used as a getter, making it possible to study its distribution on the interior surfaces of the bulb. The migration of the Ba during the life of the tube was studied by using a double-layer oxide cathode, one of the layers being radioactive. Data are tabulated.

3691* Fourier Analysis and Negative Frequencies. I. J. Shaw. *Wireless Engineer*, v. 29, Jan. 1952, p. 3-12.

Presents results of an investigation of the effect of negative frequencies in the application of the modulation theorem of Fourier Analysis. Also, 2 methods are given for obtaining the frequency spectrum of a block of sine or cosine waves of a given number of cycles duration and given initial phase. Mathematical formulas, graphs and tabular data are given.

3692* Wideband Pre-Amplifier for Atmospheric-Noise Measurement. F. Horner. *Wireless Engineer*, v. 29, Jan. 1952, p. 19-26.

Describes above apparatus developed for the purpose of increasing sensitivity of equipment used for measuring atmospheric noise levels. Deals particularly with intermodulation problems which arise in such an amplifier.

3693* Elementary Theory of Electron Ray Formation in Triode Systems. I. Properties of the Static Field of Common Ray Systems. (In German.) M. Ploke. *Zeitschrift für angewandte Physik*, v. 3, Dec. 1951, p. 441-449.

The two most important parts of the triode system for the high-vacuum production of divergent-electron bundles were investigated theoretically. Shows that, in the vicinity of the cathodes, the potential fields of the systems are unusual in that they are practically independent of electrode shape, and impart to the electron ray a conical shape. Diagrams, graphs, and tables. 15 ref.

3694* Dependence of High-Frequency Output of a Drift Tube on D.C. Output. (In German.) Rudolph Gebauer and Heinrich Kosmahl. *Zeitschrift für angewandte Physik*, v. 3, Dec. 1951, p. 449-452.

Theoretical study shows that space-charge effects modify the linear correlation between d.c. wattage and high-frequency wattage of the drift tube. Includes graphs.

3695* Remarks on the Cut-Off Frequency in Dielectric Plates. (In German.) H. Ott. *Zeitschift für angewandte Physik*, v. 3, Dec. 1951, p. 456-458.

Shows mathematically how Fresnel's formula can be used to determine the existance of a lower cut-off frequency in the above.

Miscellaneous Publications

3696 Development of Thermocouples for Use on Thermoelectric Generators. Franklin Institute, Quarterly Progress Report P-2205-4, 1951, 10 pages. (T1 F85p)

Summarizes work from July 1, to Sept. 30, 1951, on a program of theoretical and experimental research conducted for the purpose of improving understanding of the thermoelectric properties of materials and of developing a thermocouple of improved efficiency for use in thermoelectric generators. Concerned principally with the development of processes for quantity production of Zn-Sb thermocouple elements and suitable means for soldering or fusing these elements to constantan. Preparation and thermoelectric properties of PbS were investigated. Attention was given to problems involved in transfer of heat from the source to the hot junctions.

3697 Quarterly Progress Report. Research Laboratory of Electronics, Massachusetts Institute of Technology, Jan. 15, 1952, 103 pages. (TK161 M38q)

The above review includes physical electronics, microwave gaseous discharges, solid-state physics, low-temperature physics, microwave spectroscopy, molecular-beam research, magnet laboratory research, tube research and development, communication research, and analog computer research.

3698 Speed Regulation of Slip-Ring Induction Motors for Special Purposes. F. Dahlgren and P. Biringer. *Kungl. Tekniska Hogskolans Handlingar (Transactions of the Royal Institute of Technology, Stockholm,)* no. 53, 1951, 38 pages. (T4 R81t)

A theoretical and experimental investigation was carried out relating to a particular arrangement for speed regulations of a slip-ring induction motor within certain regions of operation, of special interest for industrial applications. Experimental tests are reported. The operation stability is discussed.

Books

3699 Polyphase Commutator Machines. B. Adkins and W. J. Gibbs. 230 pages. 1951. Cambridge University Press, London. (TK2789 Ad53p)

The above are described from a practical point of view. Describes, for each type of machine, the most important methods of control and the characteristics obtained. Theory is given in separate sections.

3700 Transient Analysis in Electrical Engineering. Sylvan Fich. 306 pages. 1951. Prentice-Hall, New York. (Tk3226 F44t)

The first 5 chapters are devoted to the solution of linear differential equations and their application to the classical solution of electrical and mechanical transients. The remainder deals with methods for solving higher-degree algebraic equations, the Fourier series, and an introduction to complex-variable theory and its application to the calculation of inverse Laplace transforms. A resume of electrical analogues of engineering systems is given in the last chapter.

3701 Electromagnetic Waves and Radiating Systems. Edward C. Jordan. 710 pages. 1950. Prentice-Hall, New York. (TK145 J76e)

Designed to provide a course in the above field for electrical engineers and physicists. The level of the first part of the book is suitable for seniors and beginning graduate students; the later chapters are primarily for more advanced graduate students. Numerical examples.

3702 The Design of Switching Circuits. William Keister, Alistair E. Ritchie, and Seth H. Washburn. 556 pages. 1951. D. Van Nostrand Co., New York. (TK2821 K26d)

Presents fundamental principles underlying design of switching circuits. The material is complete within itself, and explanations are often given in considerable detail. The chapters range from elementary concepts to the design of circuits containing a relatively large number of switching devices.

3703 Equivalent Circuits of Electric Machinery. Gabriel Kron. 278 pages. 1951. John Wiley & Sons, New York. (QC601 K92e)

Equivalent circuits (stationary electri-circuit models) are developed for all rotating electric machines and groups of machines by means of a unified physical picture, without any mathematical analysis. The behavior of each type of machine or group of machines is represented in the form of equivalent circuits for all operating conditions that may be expressed in terms of constant, sinusoidal, currents and speeds. Instantaneous and sustained polyphase or single-phase short circuits, sudden load variations, and self-excitations are considered.

3704 Generating Stations; Economic Elements of Electrical Design. Alfred H. Lovell. 431 pages. 1951. McGraw-Hill, New York. (TK1191 L94g4)

Surveys the above. Includes elementary principles of corporate finance, cost of stations, power-plant location, as well as generating station auxiliaries, circuit breakers and their applications, and an introduction to single-phase short circuits. Chapter problems.

3705 Fundamentals of Electronics. F. H. Mitchell. 243 pages. 1951. Addison-Wesley Press, Cambridge, Mass. (TK7815 M69f)

Discusses some of the more important fundamental phenomena and treats a few arbitrarily chosen illustrations of their applications. Stress is placed on instrumentation. Chapter problems.

3706 Fundamentals of Radio Communications. Abraham Sheingold. 442 pages. 1951. D. Van Nostrand, New York. (TK6550 Sh42f)

An intermediate level text covering general methods capabilities and limitations of radio communications; with important characteristics of the basic components and circuits used in radio equipment; and with operational features of such radio systems as a.m. and f.m., television, facsimile, miltiplex systems, radar, and loran.

3707 Alternating-Current Circuits. Ed. 2. K. Y. Tang. 603 pages. 1940. International Textbook Co., Scranton, Pa. (TK3141 T15a2)

An introductory course in the study of circuit analysis. Includes a new chapter on impedance transformation. Various other chapters were rewritten and improved. Chapter problems.

See also:
2502 (resistance-welder controls)
2513 (electronic motor and welder controls)
2844 (power generating equipment)
2869 (electronic multiplier for analogue computer)
2925 (photo flash lamps for motion-picture photography)
2958 (Al in electrical connectors)
2961 (transformer cores of cold-rolled steel)
3164 (stresses in high-pressure lamps)
3755 (research laboratories of British firm)

34. GRAPHIC ARTS

3708* Progress in Rubber Plates. *Bookbinding & Book Production*, Jan. 1952, p. 35-36, 62-63.

Describes the above. Advantages of using rubber plates are given.

3709* Grain Density Fluctuations in Photographic Emulsions. P. E. Hodgson. *British Journal of Applied Physics*, v. 3, Jan. 1952, p. 11-13.

The fluctuations of the number of grains in successive sections of tracks produced by charged particles in nuclear research emulsions were investigated.

3710* British Printing Research. *British Printer*, v. 64, Jan.-Feb. 1952. p. 48-51.

Summarizes highlights of the year's achievements in all fields of printing and packaging.

3711* The Photogravure Process: Mid-20th-Century Developments. *British Printer*, v. 64, Jan.-Feb. 1952, p. 52-55.

Discusses aspects of new developments in the above.

34. *Graphic Arts*

3712* Printing From Magnesium Cylinders. C. H. Vivian. *Compressed Air Magazine*, v. 57, Feb. 1952, p. 42-46.

Describes and discusses an engraved Mg printing cylinder trade-named Magnasleeve. Illustrated.

3713* Plastic Cut Technique Makes Color Simple. *Editor & Publisher*, Feb. 16, 1952, p. 9.

Describes and illustrates a new process for printing color. The Fairchild Scan-a-graver is used to make color separations on plastic halftones from Bourges Color Tone Sheet.

3714 Studies in the Resolving Power of Photographic Emulsions. III. The Effect of the Relative Aperture of the Camera Lens on the Measured Value. Fred H. Perrin and J. H. Altman. *Journal of the Optical Society of America*, v. 41, Dec. 1951, p. 1038-1047.

The theoretical illuminance ratio between maxima and minima in the diffraction pattern of a tricolumnar test object produced by a lens was plotted as a function of "period" of the test object. By using a series of microscope objectives, the resolving power of a wide range of emulsions was determined as a function of aperture of the camera lens. 30 ref.

3715* The Development of Ilford G5 Emulsion With ID19 Developer. A. J. Herz. *Journal of Scientific Instruments*, v. 29, Jan. 1952, p. 15-18.

Presents results of a quantitative investigation made for a range of temperatures and developing times, using the temperature-cycle method. Factors affecting uniformity of development were investigated by a new technique in which depth of penetration and degree of development occurring in the cold stage are measured as separate quantities.

3716* Densitometry. Erwin Jaffe. *Modern Lithography*, v. 20, Jan. 1952, p. 28-31.

Discusses fundamentals of the above as applied in the lithographic industry.

3717* pH Measurements in the Pressroom. *National Lithographer*, v. 59, Jan. 1952, p. 28-30.

Discusses the importance of pH values in fountain solutions. Effects of metals on pH value and pH value of uncoated paper as the cause of plate scumming are surveyed.

3718* New Color Process. Ralph S. Bing. *National Lithographer*, v. 59, Jan. 1952, p. 38.

Describes the procedure used in the Craftint Multicolor Process which is a type of color-separation procedure designed especially for the offset field.

3719* Technique Used in Cleaning, Coating, Printing Down, Etching and Finishing Magnesium Photoengraved Plates. E. R. Owen. *Printing Equipment Engineer*, v. 82, Jan. 1952, p. 20.

Describes the above in detail.

See also:
2567 (photography on anodized Al—Russian work)
2972 (offset printing on Al decals)

35. STATISTICS AND ECONOMICS

3720 Sulphur Chemical Engineering Report — January 1952. *Chemical Engineering*, v. 59, Jan. 1952, p. 165-176.

Surveys the situation to date of the above commodity. Discusses the various needs of this commodity and the present available sources. 16 ref.

3721* Aluminum Era Hastened by Defense Needs. C. W. Leihy. *Electric Light and Power*, v. 30, Feb. 1952, p. 88-91.

Discusses availability of Cu and Al, and Al prospects for electrical and mechanical applications in view of the "forced conversion" program of government control.

3722* Raising Our Capacity to Produce. Kilowatts Are the Key; Chemical Industries Boom; Metals Loosen the Logjam. *Engineering News-Record*, v. 148, Feb. 14, 1952, p. 68-70, 72-74, 77-79.

Three separate articles presenting pertinent information, and general economic status of the specific industries mentioned above.

3723 Metal Economics. I. Primary Resources of Ferrous and Non-Ferrous Metals. *Journal of the Institute of Metals*, v. 80, Jan. 1952, p. 225-237; disc., p. 237-239.

After an introduction by A. J. Murphy, the following papers were presented: "The World Supply of Non-Ferrous Metals, Including the Light Metals," R. Lewis Stubbs; "Metals as Natural Resources," S. Zuckerman; and "World Demand and Resources of Iron Ore," T. P. Colclough.

3724 Metal Economics. II. Scrap Reclamation, Secondary Metals, and Substitute Metals. *Journal of the Institute of Metals*, v. 80, Jan. 1952, p. 240-252; disc., p. 252-254.

Presents the following papers: "The Scope for Conservation of Metals, Ferrous and Non-Ferrous," C. A. Bristow, A. J. Sidery and H. Sutton; "Economy by Standardization of Alloys and of the Method of Reclamation of Scrap Metals," C. Dinsdale; "The Influence of Specifications on Productivity and the Economic Utilization of Ferrous and Non-Ferrous Metals," F. Hudson; "Secondary Heavy Metals," E. H. Jones; "Secondary Aluminum and Magnesium," W. C. Devereux.

3725* Steam Plants and the Northwest Power Shortage. Floyd D. Robbins. *Trend in Engineering at the University of Washington*, v. 4, Jan. 1952, p. 8-14.

Includes map of principal coal areas of Washington. 32 ref.

3726 Mining Geology. Olaf N. Rove. *Mining Engineering*, v. 4, Feb. 1952, p. 140-143.

Surveys recently discovered sources of various minerals.

3727* Aluminum for Defense and Prosperity. Dewey Anderson. *Modern Metals*, v. 7, Jan. 1952, 43-46; disc., p. 46.

This country has about reached its limit in the expansion of economic aluminum production, Anderson says; so the best way to foster competition and growth is to open the door to greatly increased quantities of Canadian aluminum—in other words, encourage Alcan to complete its vast Kitimat smelter as soon as possible. Includes Editor's commentary on Mr. Anderson's recommendations.

3728* Prospects. *Modern Packaging*, v. 25, Jan. 1952, p. 75-83, 175-176.

Discusses economic outlook for the raw materials of packaging. Includes paper, cellophane, metals, lumber, rubber, adhesives, waxes, and plastics.

3729* Manganese—Vital Cog in National Defense. John A. Wood. *New Mexico Miner*, v. 14, Jan. 1952, p. 5, 16-17.

Discusses its importance, foreign and domestic sources, and suggestions for increasing domestic production.

3730 Ownership of World Oil Industry. *Petroleum Engineer*, v. 24, Feb. 1952, p. B85.

Discusses briefly, and presents tabular 1950 statistics for the above.

3731 Refineries Go On Steam In Western Europe. V. S. Swaminathan. *Petroleum Engineer*, v. 24, Feb. 1952, p. C5-C8.

Describes, and gives pertinent features of, 3 new oil refineries in Europe.

3732 Aluminum: Heavy Expansion in a Light Metal. Vance Bell. *Steel*, v. 130, Feb. 4, 1952, p. 69-71.

Surveys possible new markets for Al for the day when there is no military outlet.

3733* Canada's Iron Ore Resources; Exploration and Development of the Quebec and Labrador Deposits. J. A. Retty. *Times Review of Industry*, v. 6, Jan. 1952, p. 68, 71.

3734* Summary of the Activities of the Ministry of the Coal Industry as to Capital Investments for 1950 and Problems of Mining Structural Engineers for 1951. (In Russian.) D. G. Onika. *Ugol*, v. 26, Apr. 1951, p. 5-7.

Summarizes increase of the activities of the coal industry in 1950 and outlines plans for 1951. Names of several organizations are given.

3735* The World Lead Situation. F. L. Hallam. *Western Miner*, v. 25, Jan. 1952, p. 35-38.

An address by Assistant Comptroller, Consolidated Mining and Smelting Company of Canada, Ltd.

Miscellaneous Publications

3736 An Economic Study of Fuels in Manufacturing. Walter H. Voskuil. Illinois State Geological Survey, Report of Investigations 157, 1951, 28 pages. (TN21 16r)

Presents data on the amount and kind of each fuel used per employee, by industries or industry groups; the role of electric power; the quantities used by workers; changes since 1939; comparative fuel costs; and the competitive trend among fuels. Emphasizes fuels and power in the iron and steel industries.

Books

3737 The Third Annual Management Engineering Conference. Reduction of Operating Costs. Unpaged. 1950. Agricultural and Mechanical College of Texas, College Station, Texas. (HF5686.M3 T31r)

A series of talks on cost control in industry presented at the above conference, held Mar. 1-2, 1950.

3738 Capital Development in Steel; A Study of the United Steel Companies, Ltd. P. W. S. Andrews and Elizabeth Brunner. 374 pages. 1951. Basil Blackwell, Oxford, England. (HD9521.9 An27c)

Gives detailed information on production techniques and processes, industrial environment and development, managerial reorganization and financial reconstruction, and capital development from the thirties through 1950. The theory of investment decisions is stressed.

3739 Voennaia Ekonomika SSSR v Period Oteehestvennoi Voiny. (War Economy of the U.S.S.R. During the Period of World War II). N. Voznesenskii. 191 pages. 1948. State Publishing House for Political Literature, U.S.S.R. (HC331 V94v)

Consists of 16 treatises on separate phases of the domestic economy of the U.S.S.R. during its war with Germany. Production figures are presented in the text in a general manner.

See also:
2356 (iron-ore resources)
2385 (steel industry resources)
2465 (steel-forging statistics)
3014 (fuel economcis—present situation)
3016 (petroleum chemicals in Britain)
3080 (mineral-resource conservation)
3180 (coal economics)
3552 (agricultural economics conference)
3647 (economic factors in design of large generating stations)
3704 (economics of power-station design)
3760 (airline economics)

36. MISCELLANEOUS

3740* "Recidal." Characteristics of a New High Resistance, Free-Cutting Light Alloy. (In Italian.) *Alluminio*, v. 20, Nov. 1951, p. 471-488.

Presents a detailed study, with advantages and disadvantages of the above alloy which contains 4.0% Cu, 1.5% Fe, 0.6% Mg, 0.7% Si, 0.2% Ti, 1.0% Pb-Cd, and the remainder Al. Includes photographs, micrographs, tables, and charts. 111 ref.

3741 Water in Industry. *Chemistry & Industry*, Dec. 31, 1951, p. 1169-1234.

Special issue consisting of introduction plus 11 papers on specific aspects of the above. Selected papers are separately abstracted.

3742 Rate of Expenditure on and Evaluation of the Results of Industrial Research. Wallace Akers. *Industrial Chemist and Chemical Manufacturer*, v. 28, Jan. 1952, p. 11-12.

Brief general discussion.

3743* *Food Technology.* Published monthly by Institute of Food Technologists, Champaign, Ill.

Articles are mainly devoted to commercial and pilot-plant studies of food treatment.

3744 Research in Progress. *Journal of Metals*, v. 4, Feb. 1952, p. 144-152.

Contains the following brief reports: "Vanadium-Base Alloys" William Wilson, Jr.; "Vandium-Oxygen Solid Solutions," A. U. Seybolt and H. T. Sumsion; "Studies on the Kinetics of Transformation in Titanium Base Alloys," W. Rostoker; "Mechanism of Plastic Flow in Titanium," F. D. Rosi, C. A. Dube, and B. H. Alexander; "Dimensional Changes Normal to the Diffusion Direction," R. W. Balluffi and B. H. Alexander; "Embrittlement of High Chromium Ferritic Stainless Steels at 475°C," A. J. Lena and M. F. Hawkes; "Diffusion in Iron Oxides," L. Himmel, R. F. Mehl, and C. E. Birchenall; "Deformation of Ferrite Single Crystals," F. L. Vogel, Jr. and R. M. Brick; "Slip & Twinning in Single Crystals of Beryllium," H. T. Lee and R. M. Brick; "Solid Solubility of Boron in Iron," M. E. Nicholson; "The System Molybdenum-Boron," R. Steinitz; "Anelastic Studies of the Effects of Nitrogen in Molybdenum," R. Maringer and G. T. Muehlenkamp; "Orientation Relationships in Cast Germanium," W. C. Ellis and Jacqueline Fageant; "Distribution of Solute Elements Between Liquid and Solid Germanium," J. D. Struthers, H. C. Theuerer, E. Buehler, and J. A. Burton; "Orientations in Annealed, Very Large-Grained Aluminum," R. G. Treuting and W. C. Ellis; "One and Two Dimensional Sections of Three Dimensional Structures," C. S. Smith and L. Guttman; "Principles of Zone-Melting," W. G. Pfann; "Intercrystalline Failure of Metals at Elevated Temperature," O. C. Shepard; "General Aspects of Metallic Binary Phase Diagrams," R. A. Oriani; "Effect of Cold Deformation and Annealing on Young's Modulus of Metals," M. E. Fine and N. T. Kenney; "The Influence of Solute Atoms on Crystallographic Texture and Creep Properties," C. L. Corey; "Generation of Porosity During Diffusion," R. W. Balluffi and B. H. Alexander.

3746 A Repetitive Spark Source for Shadow and Schlieren Photography. G. K. Adams. *Journal of Scientific Instruments*, v. 28, Dec. 1951, p. 379-384.

Two methods of producing sparks of high brightness and short duration at high repetition frequencies are discribed. The circuits used are simplified versions of standard radar techniques and moderate voltages. The elementary principles underlying the methods are briefly discussed and suggestions are made for increasing the flash energy and repetition frequency. 11 ref.

3747 Review of Materials Engineering Developments in 1951. T. C. Du Mond. *Materials & Methods*, v. 35, Jan. 1952, p. 103-114.

Presents a round-up of the major developments in: iron and steels, nonferrous metals, nonmetallic materials, fabricated parts and forms, finishes and coatings, heat treating, cleaning and finishing, and welding and joining.

3748 Copper and Copper Alloys; A Survey of Technical Progress During 1951. E. Voce. *Metallurgia*, v. 45, Jan. 1952, p. 16-22.

Principal items of interest on such subjects as raw-material resources, extraction, fabrication, finishing, and properties are discussed. 188 ref.

3749 Pure and Applied Science in American Metallurgy. Cyril Stanley Smith. *Metal Progress*, v. 61, Jan. 1952, p. 51-54.

Surveys the above. Stresses the benefits to be derived by the metallurgist by knowledge in other fields: i.e., physics, chemistry, etc.

3750 Steel for Machinery; Yesterday, Today and Tomorrow. Muir L. Frey. *Metal Progress*, v. 61, Jan. 1952, p. 55-58.

Discusses discernible trends in the above. Reviews past progress.

3751* Industry—the Atom and Nuclear Power. *Nucleonics*, v. 10, Jan. 1952, p. 16-23.

Three talks discuss above topic: "An Invitation to Industry," T. Keith Glennan; "A Factual Look at Our Atomic-Energy Program," Gordon Dean; and "British View of Nuclear Power," John Cockcroft.

36. *Miscellaneous*

3752* Secrecy in Nuclear Engineering. J. G. Beckerley. *Nucleonics*, v. 10, Jan. 1952, p. 36-38.

Discusses perplexing problem of how to develop strength in a vital effort without lending help to unfriendly nations. The man who is closest to this problem questions whether we can effectively compete in the world atomic race unless we let down the barriers of secrecy. This problem is considered specifically as applied to raw materials, ore concentration and beneficiation, feed materials, production of fissionable materials, and production of atomic weapons.

3753* The Hazard Involved in the Use of Carbon-14. Howard E. Skipper. *Nucleonics*, v. 10, Feb. 1952, p. 40-44.

Discusses the nature of the above. 13 ref.

3754 Aircraft Armament. Gordon A. Blake. *Ordnance*, v. 36, Jan.-Feb. 1952, p. 570-572.

Address by chief of the Weapons Components Division, Wright Air Development Center, Wright-Patterson Air Force Base, Dayton, Ohio. States that our aerial weapons have not kept pace with recent advancements in aircraft speed and performance.

3755 The Research Laboratories of Associated Electrical Industries, Ltd. Arthur Fleming, B. G. Churcher, and L. J. Davies. *Proceedings of the Royal Society*, ser. A, v. 210, Dec. 20, 1951, p. 145-172.

An extensive illustrated description of various aspects of above British laboratories, which are engaged not only in practical electrical and electronic problems, but also in such fields as mechanical engineering, metallurgy and metal-working, physics, chemistry, etc.

3756* The Minerals and Metals in Coal. J. L. P. Wyndham. *South African Mining and Engineering Journal*, v. 62, Dec. 15, 1951, p. 659, 661.

Reviews the above. Possibilities of utilization are discussed. The vitranized portion of the coal matrix contains Ge, V, Mo, Ga, and other elements. Minor constituents in the form of P, As, Cl, and S are also discussed.

Miscellaneous Publications

3757 The Role of Engineering in Nuclear Energy Development. N. F. Lansing. U. S. Atomic Energy Commission, TID-5031, Dec. 1951, 509 pages. (UF767 Un3ti)

Presents a symposium composed of 23 papers by various authors on the above.

Books

3758 Proceedings: The Second Annual Management Engineering Conference. Job Evaluation and Merit Rating. Unpaged. Agricultural and Mechanical College of Texas, College Station, Texas. (T60.J6 T31j)

A series of papers presented at above conference.

3759 Proceedings of the Fourth Annual Management Engineering Conference. Executive Development. Unpaged. 1951. Agricultural and Mechanical College of Texas, College Station, Texas. (HD5500 T31e)

A series of talks given at the above conference on development of capable men and women for executive positions.

3760 Airline Operation. R. Dixon Speas. 363 pages. 1948. American Aviation Publications, Washington, D.C. (TL552 Sp31a)

Discusses the many operating factors bearing upon the ability of an air transport company to give satisfaction both to the public and to its stockholders. Illustrates and discusses airline organization, flight and ground equipment, procedures, problems, services, and economics.

3761 Major Activities in the Atomic Energy Programs, January-June 1951. 151 pages. July 1951. U. S. Government Printing Office, Washington. (UF767 Un3m)

3762 Going Abroad for Business. Edmund B. Besselievre. 242 pages. 1946. Reinhold Publishing Corp., New York. (HF1007 B46g)

Gives practical information on the ethics of social and business contacts and responsibilities for men and their families going abroad. Also deals with criteria important in selecting representatives. Stresses the Southern hemisphere, especially South and Central America.

3763* British Chemicals and Their Manufacturers; The Directory of the Association of British Chemical Manufacturers (Incorporated.) 169 pages. 1951. Association of British Chemical Manufacturers, London. (Directory Shelf.)

3764 Business Cycles and Forecasting. Ed. 3. Elmer Clark Bratt. 585 pages. 1949. Richard D. Irwin, Inc., Chicago, Ill. (HB3711 B73b3)

Provides the background essential for explaining economic change, and points the way toward the possibilities for stabilizing and controlling business cycles. Seasonal variation, business-cycle fluctuation, and longer-term movements are considered separately because they represent different patterns of behavior.

3765 Herbert H. Dow, Pioneer in Creative Chemistry. Murray Campbell and Harrison Hatton. 168 pages. 1951. Appleton-Century-Crofts, New York. (TP140.D6 C15h)

Presents an account, in nontechnical terms, of one man's share in the founding of a company and, in a way, of an industry.

3766 Economic Mobilization and Stabilization. Lester V. Chandler and Donald H. Wallace. 610 pages. 1951. Henry Holt and Co., New York. (HC106.5 C36e)

A comprehensive survey of selected materials on the economics of war and defense. 26 articles by different authors cover various phases.

3767 Commercial Air Transportation. Ed. 3. John H. Frederick. 473 pages. 1951. Richard D. Irwin, Inc., Chicago. (TL521 F87c3)

Detailed discussion of developments in the above. Includes details of federal regulatory policies and problems, services and operating methods of the airlines and related agencies.

3768 Annual Report of the Board of Regents of the Smithsonian Institution. 522 pages. 1950. U. S. Government Printing Office, Washington. (Q11 Sm69)

Presents a summary of the operations, expenditures, and condition of the institution for the year ended June 30, 1950. Appendix consists of several articles discussing specific scientific fields or problems.

3769* Chemical Trade Names and Commercial Synonyms; A Dictionary of American Usage. William Haynes. 279 pages. 1951. D. Van Nostrand Co., New York. (TP9 H327c)

This book is not a chemical dictionary. Accordingly, you will look in vain here for "sodium hyposulfite" or its strictly chemical synonym, "sodium thiosulfite." You will, however, find listed this chemical's commercial synonyms, "hypo" and "antichlor" and the trade name "Hyporice" (Mallinckrodt.) Includes addresses of manufacturers.

3770 Mathematical Solution of Engineering Problems. J. Jennings. 208 pages. 1951. E. & F. N. Spon, Ltd., London. (QA401 J44m)

Intended to fill the gap between elementary and advanced texts. Numerous examples.

3771 Transport Facilities, Services and Policies. Emory R. Johnson. 409 pages. 1947. Appleton-Century-Crofts, New York. (HE206 J63t)

Presents an account of the facilities used and the services rendered by the several transportation agencies. The policies followed by the carriers and the government concerning the development, the interrelations, and the services of the 5 modes of transportation are discussed.

3772 Transportation; Economic Principles and Practices. Emory R. Johnson, Grover G. Huebner, and G. Lloyd Wilson. 678 pages. 1940. Appleton-Century-Crofts, New York. (HE151 J63t)

Each of the 5 kinds of transportation—railroad, pipe line, air, water, and highway—is discussed. One-third of the volume is devoted to railroad transportation and the practices, principles and problems connected therewith. Chapter references.

3773 Economics of Transportation. Ed. 3. D. Philip Locklin. 885 pages. 1951. Richard D. Irwin, Chicago. (HE2741 L81e3)

Emphasizes those aspects of transportation which involve questions of public policy. Chapter references.

3774 Manufacturing Equipment and Processes. Charles W. Lytle and Arthur F. Gould. 759 pages. 1951. International Textbook Co., Scranton, Pa. (TJ1125 L99m3)

Describes the above as applied to the metallurgical industries. Illustrations and chapter references.

3775 Guide to Foreign Sources of Metallurgical Literature. John T. Milek. 95 pages. 1951. Richard Rimbach Associates, Pittsburgh 12, Pa. (Z6678 M59g)

The guide provides leads and answers to hundreds of questions pertaining to foreign metallurgical information. Section A lists the various foreign metallurgical societies and associations. Periodicals covering the field of metallurgy are presented in Section B. Because most of these periodicals cover many topics, the titles are listed alphabetically rather than by subject.

3776 How to Solve It; A New Aspect of Mathematical Method. G. Polya. 224 pages. 1948. Princeton University Press, Princeton, N. J. (QA11 P76h)

Presents a description of the study of methods of solving problems. Special attention is given to the requirements of students and teachers of mathematics.

3777 Civil Defense in Modern War. Augustin M. Prentiss. 429 pages. 1951. McGraw-Hill (UA926 P91c)

Specifically a text on the protection of the civil population against atomic, bacterial, and chemical warfare.

3778 Overseas Railways 1951. 210 pages. 1951. Railway Gazette Publications, London. (Oversize.) (HE1017 O2)

A *Railway Gazette* publication reviewing the present position and development program of railways overseas. Articles by various authors.

3779 The Rockefeller Foundation; Annual Report 1950. 415 pages. 1950. The Foundation, New York. (Pamphlet File)

Includes detailed reports of the Secretary and the Treasurer of the Foundation, the Director for the International Health Division, and the Directors for Medical Sciences, Natural Sciences, Social Sciences, and Humanities.

3780 Policy Formulation and Administration; A Casebook of Top-Management Problems in Business. George Albert Smith. 653 pages. 1951. Richard D. Irwin, Chicago. (HD31 Sm57p)

Presents 30 cases giving a description of actual companies. Intended for the advanced student.

3781* Brassey's Annual; The Armed Forces Year-Book 1951. H. G. Thursfield, editor. 460 pages. 1951. MacMillan Co., New York. (U10 B73)

Presents articles by various authors on various phases of the armed forces. Includes articles on Soviet and Western strategy, the Korean front and the pattern of future war.

3782 The Supply of Water. Ed. 2. T. H. P. Veal. 276 pages. 1950. Chapman & Hall, London. (TD345 V48s2)

Presents in as brief a manner as possible the best available information concerning subjects including hydrology, design and construction of reservoirs, layout of distributing systems, and purification of water. Chapter references.

3783 Gidrotorf (Hydro-Peat). M. A. Veller. 220 pages. 1946. State Power Engineering Publishing House, Moscow and Leningrad, U.S.S.R. (TN840R9 V54g)

This textbook describes the process of hydraulic peat mining and the organization of the work of the laborers in extraction and treatment. This book is slanted mainly toward semi-technical workers in the industry to enable them to organize more efficiently. Numerous diagrams.

3784* Waste Trade Directory of Dealers and Consumers in the United States and Canada. 990 pages. 1951. Atlas Publishing Co., New York.

The above lists include dealers in textile equipment, rubber machinery, scrap metals, auto wreckers, second-hand bags and bagging, paper mills, etc. Arranged by states and cities under broad headings.

3785 How to File and Index. Rev. Ed. Bertha M. Weeks. 306 pages. 1951. Ronald Press Co., New York. (HF5736 W41h)

Describes principles and procedures in the above, applicable largely only to correspondence files, business offices, and non-technical filing systems.

3786 3100 Needed Inventions. Raymond F. Yates. 336 pages. 1951. Wilfred Funk, Inc., New York. (T19 Y27t3)

Lists the above. Stresses the need for inventors with analytical minds able to improve the ordinary equipment we come in contact with in our everyday lives. Includes metallurgical problems.

3787 Dating the Past; An Introduciton to Geochronology. Frederick E. Zeuner. 474 pages. 1950. Methuen & Co., Ltd., London. (QE508 Z62d2)

Develops time-scales in years which extend beyond the historical calendar. Applications in archaeology, biological evolution, geology, and geophysics are given.

See also:

2988 (utilization of fission products)
3078 (high-altitude flight problems)
3160 (Patent Office files as design source)
3369 ("Physical Biochemistry"—Book)
3633 ("Electrophoresis in Physiology"—Book)
3654 (electronic engineering in medicine)

Notes From Battelle

FARMERS PUSH RESEARCH

Wheeler McMillen, in the February, 1952, issue of *Chemurgic Digest*, poses the question as to the farmer's attitude toward research and asks, "What about research that farmers themselves pay for?"

"Only a few years ago," he states, "it would have been sensational, or maybe irrational, to suggest that farmers would provide funds to pay for agricultural research. The idea would have been received as impractical.

"North Carolina farmers a few weeks ago voted nine to one in favor of assessing themselves to enlarge the research activities at their state agricultural college . . . Few indeed are the farmers who have any doubts about using the results of research. Through several decades now farm youth has studied in vocational high schools. Four-H Clubs, Future Farmers of America, and the extension system have constantly exposed young people to science. The youth of yesterday who are the farmers today have seen the evidence.

". . . Several thousand farmers (in a poll conducted by the Ohio Farm Bureau last spring) were presented a list of eleven proposals or possible solutions to problems of surplus, should such problems arise in the future. The largest vote was for research—74 per cent. Ohio farmers apparently believe that their future lies with facts rather than with subsidies.

". . . Government research in chemurgy and all along the agricultural front has been invaluable. Private industry has paid for research which each year now comes up with impressive new tools for agriculture to use. It is not surprising that farmers want more of the same, nor remarkable that they are willing to pay for it."

☼ ☼ ☼

RESEARCH EXPENDITURES INCREASE

Expenditures for research in manufacturing industries have risen substantially since 1946, although they have not quite kept pace with sales, the National Industrial Conference Board reports. A survey of 125 companies shows that the majority spent more money in 1951 than in 1946 on research. Most of these companies anticipate even greater expenditures in 1952, with dollar expenditures to rise from 10 to 25 per cent over 1951 levels. Many plan to increase their research and development activity in relation to total sales.

Appreciable shifts in research emphasis in the past five years were reported by about half of the manufacturers. Generally this shift has been toward more fundamental research, new-product research, and product development.

Although over half the companies reported that they are doing research in connection with government work, only four companies stated that such activities amounted to as much as 50 per cent of their total research program. On the other hand, about three-fourths of all companies doing government research reported that it is either a negligible amount or less than ten per cent of their research activities.

☼ ☼ ☼

NEW COMPOUND PREPARED

Research at Battelle on the carbides of uranium has established that the sesquicarbide (U_2C_3), previously believed to exist at high temperatures, does actually exist and is stable at room temperature. U_2C_3 was prepared from a mixture of UC and UC_2, isolated, and its properties determined.

It is hard, brittle material, having a bright luster when fractured. It appears to be stable from sub-zero temperatures to about 1800°C. It can be converted to UC and UC_2 by heating to a temperature above 1800°C., holding for a short period of time, and then cooling in the furnace.

A report on the preparation, microstructure, crystal structure, and properties of the material was published in the December, 1951, Journal of the Electrochemical Society.

☼ ☼ ☼

ELECTROPOLISHING AIDS PRODUCTION

Electropolishing is helping industry mass-produce the blades for turbine and compressor wheels needed in our defense production program.

In one installation, the change to electropolishing technique to finish blades permitted the saving of 970 man-hours in the production of 2000 blades. The final finish is better than previously achieved by hand methods.

Electropolishing, a development that Battelle pioneered, maintains the shape contour of the part being finished and at the same time selectively removes "mechanically damaged" surface metal. In effect, it "machines" away electrically metal not wanted, creating a smoother surface. The smoothness of surface increases the air-foil efficiency of turbine blades. In-

spection is also aided, since the lustrous surface achieved shows imperfections which are not disclosed by other finishing methods.

☼ ☼ ☼

MICROTOME DEVELOPED

A high-precision instrument capable of slicing biological tissue about five-millionths of an inch thick has been developed at Battelle. The instrument, known as a "cantilever microtome", makes it possible to utilize the full advantages of the electron microscope in the study of animal and plant tissue, with particular regard to cell structure and changes therein.

Standard microtomes are designed to cut sections from one to two microns in thickness, which sections are satisfactory for use in a light microscope. However, because of the low penetrating power of electrons, it is necessary to use sections of the order of 0.1 micron thick for electron microscopy. The Battelle microtome was designed to do this.

The cantilever microtome can cut sections of tissue to a thickness of about five-millionths of an inch. Any tendency for the instrument to deviate from the desired path of motion is controlled by its design features. Motion of the specimen across the knife is provided by a system of cantilevers. These consist of a pair of broad flat steel springs or blades having extremely high rigidity in the plane of the blade but adequate flexibility in the plane of motion. When deflected and released, the motion is highly reproducible. Slices, consequently, are uniform in thickness.

☼ ☼ ☼

TEAMWORK IN RESEARCH

A recent research assignment handled by Battelle for the NACO Chemical Company, a subsidiary of W. R. Grace & Company, illustrates the effectiveness of teamwork in getting research results. NACO asked Battelle to develop a 20-20-20 N-P-K plant food for home and garden use which would meet a rigid set of specifications. The plant food, in addition to the high concentration of nitrogen, phosphorus, and potassium, must contain, in proper balance, all the micronutrients normally needed for plant growth; must be completely available; must enter solution without formation of a precipitate; must not cake or deteriorate in storage; must be effective in promoting plant growth either when applied to the soil or sprayed on foliage; and must be amenable to amateur use without danger of burning or overfertilizing plants.

A project of this nature could be a long, involved series of experiments by a chemist or soil agronomist alone; but, by using the combined knowledge of chemists, agronomists, specialists on micronutrients, physicists, and packaging and production engineers, the fertilizer had been developed, proved upon hundreds of plants of numerous varieties, and was in production in a period of months.

Except for the requirement that the formulation be non hygroscopic, the chemistry involved was not difficult, and the main problems were in production packaging, and devising a "foolproof" system for amateur application. The latter was solved by packaging in cartons of 32 individual foil packets, each packet of which makes two gallons of liquid plant food. Greenhouse tests upon plants established the safety of the concentration in normal use and misuse. The product is being marketed throughout the country this year.

☼ ☼ ☼

PATENTS ISSUED

During 1951, 33 U. S. and foreign patents were issued on 23 inventions and processes submitted by members of the Battelle staff. The patents covered new developments in metallurgy, ceramics, electroplating, production machinery, paints, the graphic arts, and consumer products.